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ABSTRACT

This short booklet on the geography of the Netherlands, designed for use at the upper elementary and secondary levels, contains 17 short descriptive analyses of Dutch physical and human geography. Each section is well illustrated with diagrams and maps. Titles of the sections include (1) High Netherlands--Low Netherlands, (2) Land Reclamation, (3) Polder Landscape, (4) The Zuyder Zee Project, (5) The Delta Project, (6) Water Control, (7) Demography, (8) Distribution of Population, (9) The West Holland Conurbation, (10) The Economy, (11) Agricultural Means of Support, (12) Mining, (13) Industry I, (14) Industry II, (15) Trade and Transport, (16) The Ports of Amsterdam and Rotterdam, and (17) Physical Planning. The booklet is designed to be used with an accompanying wall map which, due to its size, is not included in this document. The wall map is available from the Information and Document Centre. (DE)

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A compact geography of The Netherlands

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Preface

This 'Compact Geography of the Netherlands' has been compiled by the Information and Documentation Centre for the Geography of the Netherlands at the request of the Ministry of Foreign Affairs, The Hague.

When the Council of Europe asked member countries to nominate eminent geographers for the purpose of exchanging information and arriving at a better understanding of national images, which to some extend had become formalised in the various textbooks, a torrent of correspondence was received, which the above Centre dealt with as best it could. The correspondence revealed a need for a brief summary of the geography of the Netherlands.

Geography is taught differently in different countries and more periods are devoted to geography in one country than in another. For this reason, it seemed best to use a typically Dutch method and let readers make their own selection. So great was the demand for the booklet that a reprint was necessary after only two years. The opportunity was taken to rearrange the book and bring the statistical data up to date. It is still possible, of course, that, in view of differing international needs, the material may appear to some to be too copious, to others inadequate.

The booklet is also intended to be used in conjunction with the school map of the Netherlands and is meant for geography students, secondary school teachers and teachers in the upper classes of primary schools.

Further information, documentation and bibliographical references are obtainable from the Information and Documentation Centre for the Geography of the Netherlands, State University, Heidelberglaan 2, Utrecht, or from the Netherlands Embassy in your country.

Writers of textbooks abroad may reproduce the maps, etc. in the booklet, provided that the source is acknowledged.

Application for photographs to illustrate such books can be made to the Information and Documentation Centre or to the Netherlands Embassy, where a selection may be made from a modest collection of contact prints.

Finally, the compilers of the booklet wish to express their thanks to the staff of the Central Statistical Office in The Hague for their generous assistance in the production of the present revised edition.

The Hague/Utrecht, 1974.

Introduction

Low-lying, flat, small and packed

The aerial photograph reproduced on the cover of the booklet (the Brienenoord Bridge over the lower reaches of the Rhine to the east of Rotterdam) contains a synthesis of many of the factors involved in the study of the geography of the Netherlands. There we see the low-lying, flat landscape, criss-crossed by watercourses, large and small, which is characteristic of a large part of the Netherlands. Permanent habitation became possible only when the people had learned how to build dykes to repulse most of the onslaughts of the water and to control the water level in the areas so protected. These areas are known as polders. It then became possible, too, to take advantage of the natural potentialities of the soil, pasture land often proving more suitable than other uses.

The Dutch have also made full use of the possibilities for communication afforded by the sea and the big rivers, so that the country developed into an important centre for trade, while shipbuilding and the processing of imported raw materials and semi-finished products likewise encouraged industrialisation.

Since these conditions exist almost exclusively in the western part of the country, this is the part that has become most densely populated and where land-use has become most intensive, as can be seen from the road networks and blocks of flats in the photograph.

The higher and less densely populated regions in the east and south of the country present a picture which differs in many ways from that of the west. But before dealing with all these points in turn in the following chapters, let us first fill in the general background.

Form of government

The Netherlands is a parliamentary democracy under a constitutional monarchy; the Head of State is H.M. Queen Juliana. Parliament consists of two Chambers, elected by universal suffrage.

The capital is Amsterdam, but the seat of Government is The Hague (Den Haag).

Geographical location

The Netherlands, which covers an area of 36,854 km², is situated in the west of the European and Asiatic continent between approximately 50°45′ and 53°30′ latitude North and between 3°30′ and 7°0′ longitude East.

The country lies on the North Sea at the mouths of the rivers Rhine, Maas and Scheldt. From the point of view of physical geography, the Netherlands belongs to the north-western European plain.

The highest point, 321 metres above sea level, is in the extreme south-east; the lowest point, 6.70 metres below sea level, is north of Rotterdam (see map on page 7). Twenty-seven per cent of the total area of the country lies below mean sea level; 60 % of the total population live in that 27 %.

Its geographical situation gives the Netherlands a temperate maritime climate, with an average temperature of 1.7°C in January and 17°C in July. There is a total precipitation of over 700 mm spread fairly evenly over the year.

Provinces and population

The Netherlands is divided into eleven provinces and 850 municipalities. With a population of 13.4 milion (as at 1.1.73)–the equivalent of 396 per square kilometre of land—it is one of the most densely populated countries in the world.

Historical notes

The heyday of the Netherlands, formerly a trading nation par excellence, was in the 17th century, which is known as the Golden Age. During that period, the Dutch built up a world-wide trading network with trading posts on many coasts. Famous private trading companies often controlled whole States, for example in Indonesia, Ceylon, parts of of Brazil and southern Africa. At home, art and culture flourished and famous names such as Rembrandt and Vondel date from this period.

When the European States began to protect their own growing trade and industry, the expansion of Dutch trade was halted. A second period of flourishing trade came in the years between 1850 and 1910.

During the Second World War the governments in exile of the Netherlands, Belgium and Luxembourg decided to establish a customs union, which was later extended into an economic union. This union served

Amsterdam Capital
Groningen Provincial capital
Town with more than 100,000 inhabitants
Town with less than 100,000 inhabitants
Provincial boundary
Major canal
5° E. long.
SCHIERMONNIKOOG
AMELAND
TERSCHELLING
VLIELAND
TEXEL
WADDEN SEA
GRONINGEN
Leeuwarden
Groningen
FRIESLAND
Assen
DRENTHE
LAKE YSSEL
NORTH HOLLAND
NORTH SEA
Zwolle
OVERYSSEL
FLEVOLAND
Haarlem
Amsterdam
North Sea Canal
Amsterdam Rhine
Apeldoorn
Enschede
Yssel
The Hague
Utrecht
GELDER-LAND
SOUTH HOLLAND
UTRECHT
Arnhem
52° N. lat.
New Waterway
Rotterdam
Lek
Canal
Lower Rhine
VOORNE
PUTTEN
GOEREE
HOEKSE WAARD
Dordrecht
Waal
Nymegen
SCHOUWEN
OVER-FLAKKEE
DUIVE LAND
Maas (Meuse)
Bois-le-Duc
ZEELAND
Eastern Scheldt
NORTH BRABANT
Rhine
WALCHEREN
THOLEN
Middelburg
Breda
Tilburg
Essen
Western Scheldt
SOUTH BEVELAND
Eindhoven
Duisburg
ZEEUWS-VLAANDEREN
Antwerp
LIMBURG
Düsseldorf
Ghent
Scheldt
BELGIUM
Cologne
Brussels
Maastricht
FEDERAL REPUBLIC OF GERMANY
0 10 20 30 40 50 60 70 80 km
0 10 20 30 40 50 miles
(1972)
NETH. ANTILLES
PUERTO RICO (U.S.A.)
St. Martin
Saba
St. Eustatius
0 250 miles
15° N. lat.
BARBADOS
Aruba
Curaçao
Bonaire
COLOMBIA
VENEZUELA
TRINIDAD AND TOBAGO
65° W. Long.
TRINIDAD AND TOBAGO
56° W. long.
SURINAM
0 250 miles
VENEZUELA
6° N. lat.
GUYANA
SURINAM
FR. GUIANA
BRAZIL
The Netherlands on the same scale

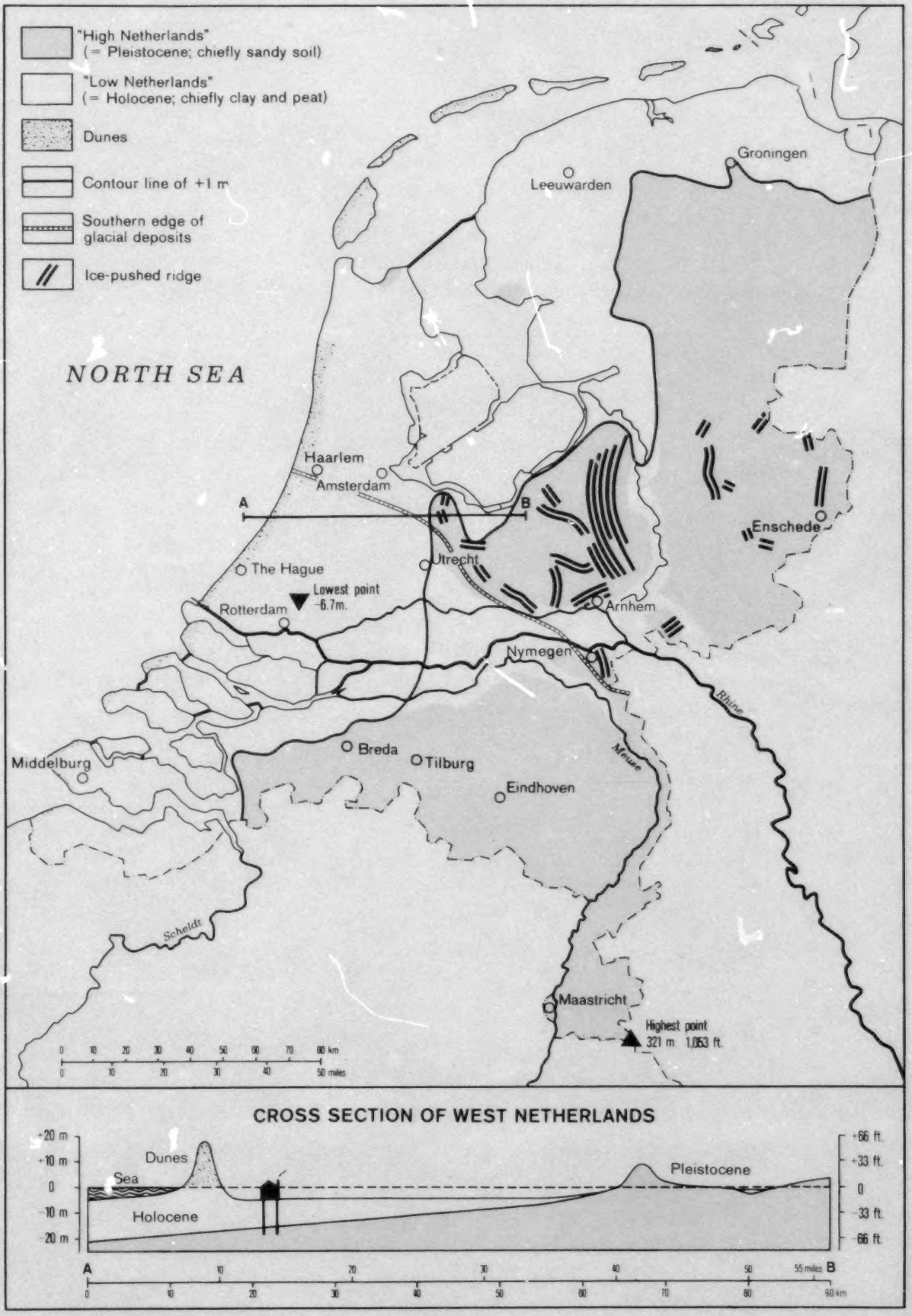
as a model for the establishment of a European Economic Union, which brought with it the free movement of money, goods and persons.
International organisations of which the Netherlands is a member include the United Nations, the O.E.C.D., the E.E.C. and N.A.T.O.
In 1943, on the initiative of the late Queen Wilhelmina, the first steps were taken to change the country's relationship with her colonies. They were given a free option of becoming equal partners within the Kingdom. In 1948, Indonesia chose to go its own way. Surinam and the Netherlands Antilles, on the other hand, united with the Netherlands in 1954 under the Charter of the Kingdom of the Netherlands.

High Netherlands - low Netherlands

The Netherlands without dykes
If the Netherlands were to lose the protection of its dunes and dykes, the most densely populated part of the country would be flooded (mostly by the sea, but also by the rivers). This would apply to the white area on the map of the Netherlands, most of which is no more than one metre above sea level (about half the total area). This area is known as the 'Low Netherlands', while the grey area is known as the 'High Netherlands'.
The difference can be explained by geological history.

Geology
In the last Pleistocene ice age but one, great ice sheets crept down from northern Europe over the Netherlands, the foremost of them reaching as far as an imaginary line drawn between Haarlem and Nymegen. In the river valleys running from south to north, the valley walls were pushed upwards and to the side, especially in the mid Netherlands (Utrecht, Overijssel and Gelderland provinces), where long ridges of hills are now situated (the ridges are known as 'stuwwallen', and now form a major recreation area).
During this Pleistocene era, the North Sea coastline lay much further to the north-west, since the sea level had dropped considerably. An extensive covering of moraine (sand, gravel, stony loam and loose boulders) was left behind in the north of the country when the ice melted.
Even before the ice age, the rivers Rhine and Maas had deposited layers of sand and gravel, brought from the central European mountains, in the centre and southern part of the Netherlands.
When the ice covering melted, north-west and west winds blew sand over the Netherlands from the areas where the North Sea had receded. The sand covered most of the ground moraine, the 'stuwwal' area and the sedimentary deposits from the rivers.
In the Holocene period which followed, the climate became warmer and the sea level rose. The North Sea flooded the western part of the Netherlands roughly as far as a line drawn through Groningen-Utrecht-Breda. A soil profile of the west of the Netherlands shows clearly that the Pleistocene layers dip towards the west (as indeed do the older layers underneath, which only come to the surface in a few places in the east and south-east of the country).
During the periods when the sea level stopped rising, sand banks were thrown up in the west of the Netherlands parallel to the present coastline. With the passage of time the old dunes were formed from these sandbanks. The new dunes were formed around 1000 A.D.; they are higher and lie partly to the west of and partly on top of the old dunes.
A sort of lagoon formed behind the old dunes, to which the sea could penetrate through openings in the dunes. At first, sea clay was deposited in the lagoon; later, as the lagoon became shallower, peat developed in the area. Occasionally the peat was dislodged by the sea, particularly in the south-west and north of the Netherlands, where sea clay was deposited once more. Later, in many places in the central part of the Low Netherlands the peat was cut for use; lakes then came into being. Where the lakes were subsequently drained, the polders have a soil of old sea clay.
River clay was also formed during the Holocene period in the river area, while peat was formed in marshy places in the High Netherlands, too.

Ground subsidence
Owing to settling of the new soils (as a result of drainage and occupation) and to the continuing relative rise of the sea level, the west of the Netherlands now lies below sea level. Before buildings can be put up in that area piles have first to be driven in as far as the Pleistocene sand (see profile).


"High Netherlands"
(= Pleistocene; chiefly sandy soil)
"Low Netherlands"
(= Holocene; chiefly clay and peat)
Dunes
Contour line of +1 m
Southern edge of glacial deposits
Ice-pushed ridge
NORTH SEA
Leeuwarden
Groningen
Haarlem
Amsterdam
A
B
Enschede
Utrecht
The Hague
Lowest point
-6.7m.
Rotterdam
Arnhem
Nymegen
Rhine
Breda
Tilburg
Meuse
Middelburg
Eindhoven
Scheldt
Maastricht
Highest point
321 m 1,053 ft.
0 10 20 30 40 50 60 70 80 km
0 10 20 30 40 50 miles
CROSS SECTION OF WEST NETHERLANDS
+20 m
+10 m
0
-10 m
-20 m
Dunes
Sea
Holocene
Pleistocene
+66 ft.
+33 ft.
0
-33 ft.
-66 ft.
A
B
0 10 20 30 40 50 60 70 80 90 km
0 10 20 30 40 50 55 miles

Land reclamation

History

After about 700 B.C. the sea occasionally penetrated so far inland as to dislodge blocks of peat behind the dunes. In the south-west and north of the Netherlands only islands remained. The former Zuyder Zee was also formed in this way; it attained its greatest extent about 1250 A.D. The inhabitants of the Netherlands contributed to the loss of land to the water by cutting peat for use as fuel and to obtain salt. The lakes grew steadily larger particularly in the peat area in the provinces of North Holland, South Holland and Utrecht (see page 6).

In the 17th century, the Golden Age, it was decided to drain a number of the lakes. Various factors were instrumental in this, including the wealth and spirit of enterprise of the Amsterdam merchants, the technical potential of the steadily improving windmills, the increasing demand for food for the expanding towns, and fear of flooding.

This continued until late into the 19th century, the windmill having been replaced in the meantime by the steam-engine (the large Haarlemmer Lake to the south-west of Amsterdam was the first instance of the State taking responsibility for drainage).

The diagram shows the amount of land reclaimed each century from 1200 to the present day.

In the island regions in the south-west and north of the Netherlands land has been reclaimed since 1200, though in a different manner. The tide comes in twice each day and leaves behind sand and mud as it withdraws. In the past, when this process had continued for long enough, the deposits came to lie above sea level, at least where there had been no storms and tidal waves for long periods. The inhabitants protected the deposits by building dykes round them. In the 19th century, a system was devised in north Groningen and north Friesland to speed up the process of deposition. This consisted of building low dams out to sea, where sand and mud could readily settle inside and between the dams. The process still continues today.

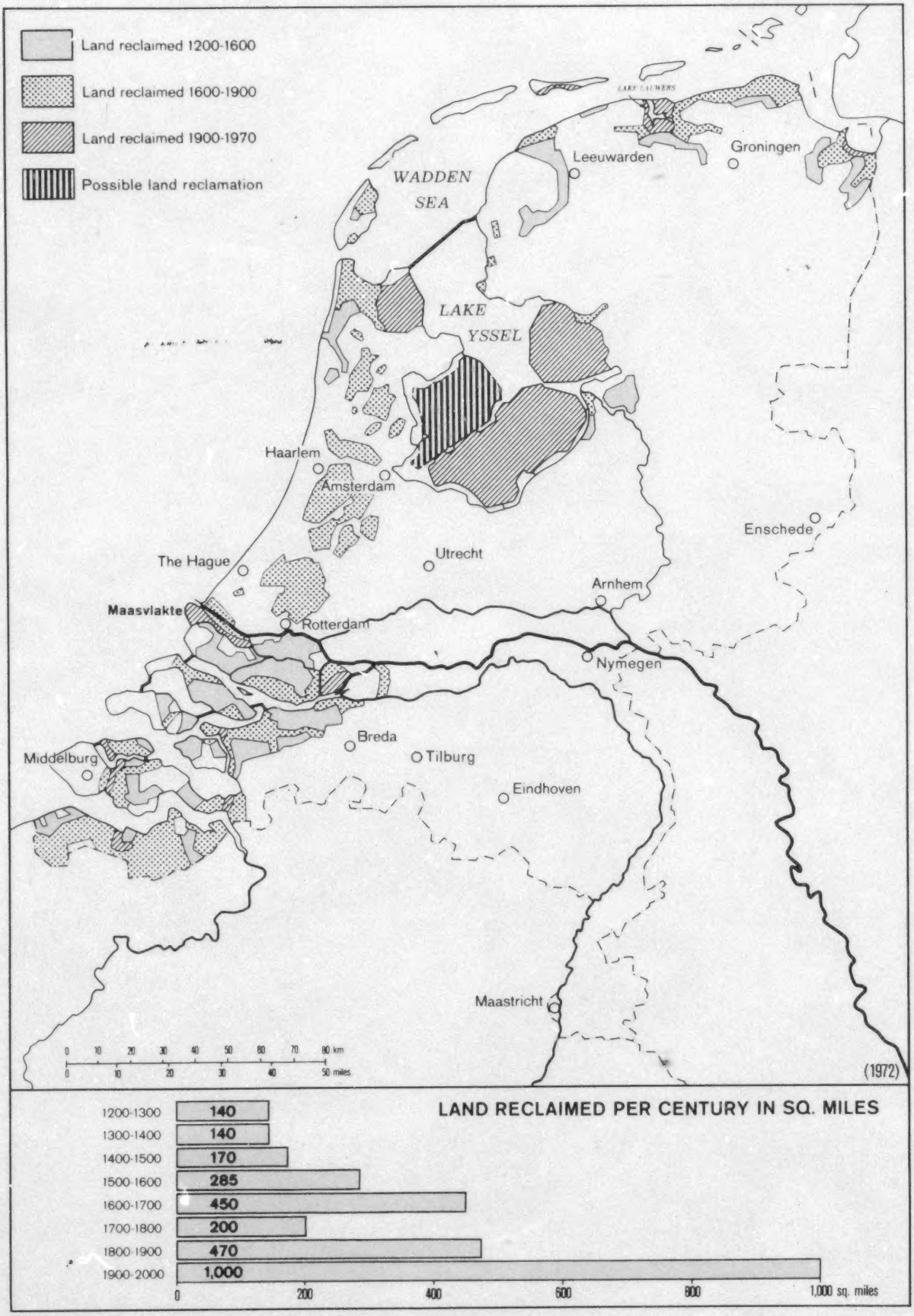
The 20th century

After 1900 land reclamation was undertaken on a still larger scale. An ambitious plan was drawn up for the polderisation of part of the Zuyder Zee. The first polder (Wieringermeer) was drained in 1930, by which time steam-driven pumps had already given way to diesel and electric ones.

In 1932 the Zuyder Zee—thereafter known as Lake Yssel—was cut off from the Wadden Shallows by a thirty kilometre long barrier dam. Of the five planned polders four are now finished. (See pp. 12/13).

Smaller areas which have been reclaimed in very recent times are the Lauwerszee (on the north coast between Friesland and Groningen) and the Maasvlakte (south of the mouth of the New Waterway) for the purpose of expanding the Rotterdam/Europoort docks and industrial area.

The proposal to partially polderise the Wadden Shallows met with strong objections from many people, including nature conservationists and biologists. Since it is very shallow and the tidal movement is very great, much of the Wadden Zee seabed is exposed twice a day, and it is a bird sanctuary and recreation area unique in the world. For the time being at least, there will certainly be no attempt to polderise it.


Land reclaimed 1200-1600
Land reclaimed 1600-1900
Land reclaimed 1900-1970
Possible land reclamation
WADDEN SEA
LAKE YSSEL
Leeuwarden
Groningen
Haarlem
Amsterdam
Enschede
Utrecht
The Hague
Arnhem
Maasvlakte
Rotterdam
Nymegen
Breda
Tilburg
Middelburg
Eindhoven
Maastricht
0 10 20 30 40 50 60 70 80 km
0 10 20 30 40 50 miles
(1972)
LAND RECLAIMED PER CENTURY IN SQ. MILES
1200-1300 140
1300-1400 140
1400-1500 170
1500-1600 285
1600-1700 450
1700-1800 200
1800-1900 470
1900-2000 1,000
0 200 400 600 800 1,000 sq. miles

Polder landscape

Hundreds of polders

Dunes and dykes protect the land against saturation with water and flooding. Villages and fields are surrounded by dykes and drainage canals. The entire west and the low-lying parts of the north (around 50 % of the land area) consist of polders - land surrounded by dykes and drained artificially.

It would be untrue to say that the polders are necessarily below sea level, though this is the case with, say, the Lake Yssel polders (3-5 m below sea level) and with the polders formed by draining lakes (the lowest is 6.7 m; see page 4). The polders in the peat areas are about 1 metre below sea level, but in the new sea-clay areas and along the rivers many polders are up to a few metres above mean sea level. In this case, it is not always necessary to use pumps to drain them; along the coast of Groningen and Friesland, for example, the sea-clay polders can be drained by simply opening the sluices in the discharge canal at ebb tide.

There are many hundreds of polders. This is because in earlier times the pumping was done by windmills which cannot be used to drain large areas. With the progress of technology and the successive development of steam, diesel and electric pumps, the polders were made larger (cf. the Lake Yssel polders).

Pumping methods

On the map, two main types of polder can be seen:

I - polders surrounded by a single dyke; and

II - polders surrounded by two dykes, with an enclosing canal between.

The first type includes what are known as marsh, river and sea polders. These polders lie in marshy areas, along rivers or on the coast. In their case, the excess water can generally be discharged direct into the 'external water' (sea and rivers).

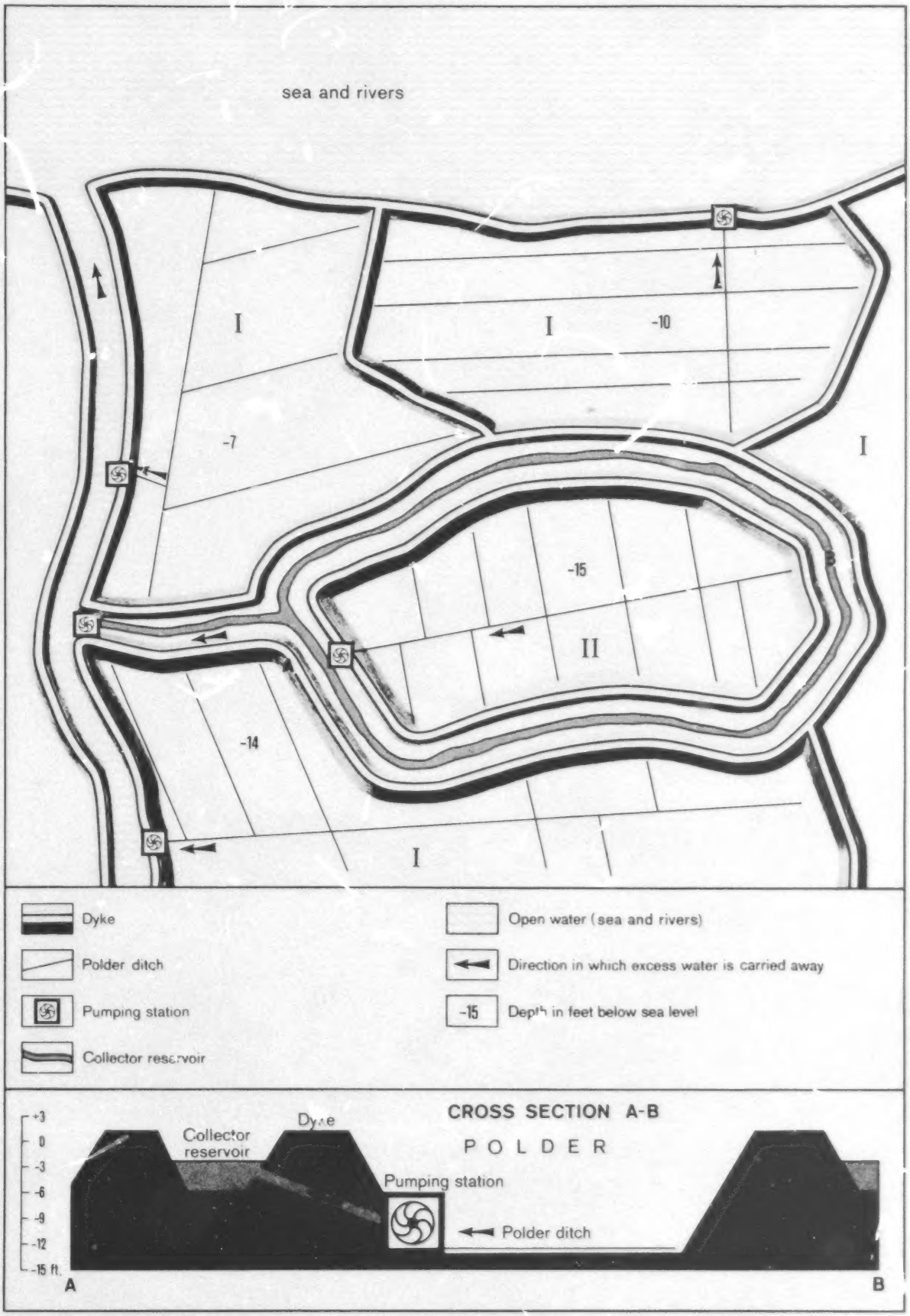
The second type includes the drained lakes, the 'droogmakerijen'. The first dyke, which runs round the former lake, is known as the ring dyke. Beyond it lies the enclosing canal, which adjoins the dykes of the surrounding polders.

The cross-section shows a common system of water control. Each polder has a particular groundwater level in relation to the surface: this is the polder level. (The desired level depends mostly on the purpose for which the polder is used.) Should the level rise, the pumps are brought into operation. In this way the excess water is pumped to the higher, temporary reservoir—a system of lakes, canals, etc. From there the excess water is discharged into the 'external' water, either by natural means or by further pumping.

Polder organisation

As far back as the middle a[ges] habitants of the polders realised that o[nly] a had been recovered from the wate[r] require a united effort to retain it. And [so] 't 'polder boards' came into being, of w[hich] e are now some 1,500. These are public bodies, controlled by the provincial authorities. The directors of a polder board are elected by the 'ingelanden' of the polders concerned (the 'ingelanden' are generally the owners of land in the polders). In the case of polder boards which are responsible for defences against the sea, Lake Yssel or the big rivers, the executive boards are appointed by the Crown.

The boards are responsible for dams, water management (quantitative and qualitative), land and water communications, and occasionally recreation and nature conservation. They are financed from a polder board tax payable by the 'ingelanden' and occasionally supplemented by grants from the central or provincial authorities.


sea and rivers
I
I
-10
-7
I
-15
II
-14
I
Dyke
Polder ditch
Pumping station
Collector reservoir
Open water (sea and rivers)
Direction in which excess water is carried away
-15
Depth in feet below sea level
CROSS SECTION A-B
POLDER
Collector reservoir
Dyke
Pumping station
Polder ditch
+3
0
-3
-6
-9
-12
-15 ft.
A
B

The Zuyder Zee project

History

At the beginning of our era the Zuyder Zee was quite a small lake, into which several rivers discharged their waters and which was linked by a narrow channel to the North Sea. Owing to the effects of tide, wind and floods, it was hollowed out more and more until it attained its final, roughly circular shape. This also explains its shallowness.
The first plans for draining it were conceived by Hendrik Stevin (1667). Towards the end of the last century, C. Lely, Secretary of the Zuyder Zee Association (the draining of the sea had by then become a national issue) worked out a plan which was later to be carried into effect with only minor modifications.
In outline, the plan was:

— a broad dyke from the coast of North Holland to the coast of Friesland, which would turn the inland sea (Zuyder Zee) into a lake (Lake Yssel);
— along the edges of the lake, where the soil was mostly clay, five large polders which would increase the area of the Netherlands bij 6 %;
— in the north, where the soil is mostly sand, a water reservoir, to be fed by the river Yssel, and linked to the sea via sluices in the Barrier Dam for the purpose of discharging excess water.

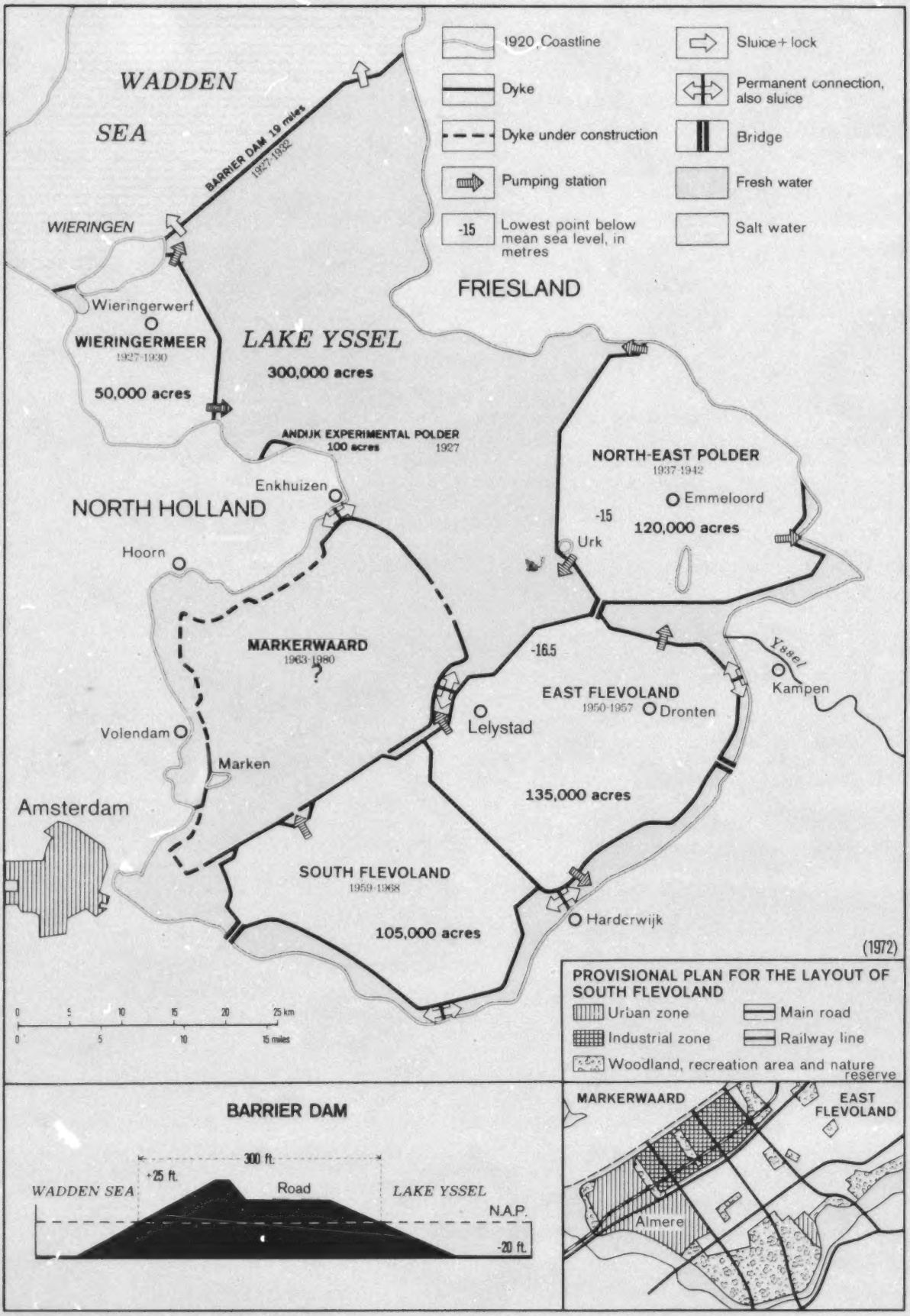
In 1920 (Lely was then Minister of Transport and Public Works) work was begun on putting the plan into effect, after a flood disaster in 1916 and food shortages during the First World War had once more emphasised the need for it.
In 1930 the first polder, Wieringermeer, was drained. The 30 kilometre long Barrier Dam was finished in 1932. This was followed in 1942 by the North-East Polder and in 1957 and 1968 by East and South Flevoland respectively. The main purpose of the peripheral lakes in the case of the East and South Flevoland polders was to prevent the ground water level in the adjoining higher parts of the 'old land' from dropping too far.
The Zuyder Zee Project will probably be completed by about 1980.

Uses of the reclaimed land

When the ground has become firm and usable (which takes several years), the polders are laid out. In planning the lay-out, endeavours are made to achieve appropriate allocation of the land, an optimum size of farm, good communications by land and water and proper vegetation.
Ninety per cent of the soil is highly suitable for agricultural purposes, especially for arable farming. As it becomes available, the land is operated by the State for the first few years, after which it is leased to farmers from all parts of the country.
In each polder a number of villages and one or more larger localities are planned to act as supply centres. Of these, it is intended that Lelystad should expand to become a centre serving the whole of the Lake Yssel area. Whether the polders will eventually come to form a twelfth province of the Netherlands is a question which cannot yet be answered with certainty.
At first it was intended that the five planned polders (together some 220,000 ha) should be used nearly exclusively for stepping up agricultural production. After the Second World War, however, it was decided that the polders should be used for other purposes as well—as residential areas, recreational areas and places for the establishment of industries and public service departments. The provisional development plan for South Flevoland, illustrated here, gives some indication of this; the town of Almere will, like Lelystad, serve as a reception area for the population overflow from the northern part of the West Holland conurbation.
Changing views on, among other things, European agriculture and control of the environment have made people wonder whether implementation of the original plan for the Markerwaard would still be justified.

Consequences for the surrounding areas

The 'old land' around Lake Yssel is also affected by the Zuyder Zee Project. The danger of flooding has been reduced considerably, improved water economy has been made possible and the fresh water of Lake Yssel can be used as drinking water and for aquatic sports purposes. Moreover, the roads across the Barrier Dam and through the new polders have shortened the lines of communication between the surrounding areas.
The consequences for a number of fishing villages on the shores of the former Zuyder Zee have been less favourable; however, three sluices in the Barrier Dam enable the fishermen to continue to work on the North Sea and the Atlantic Ocean. Fishermen from the former island of Urk make most use of this arrangement.

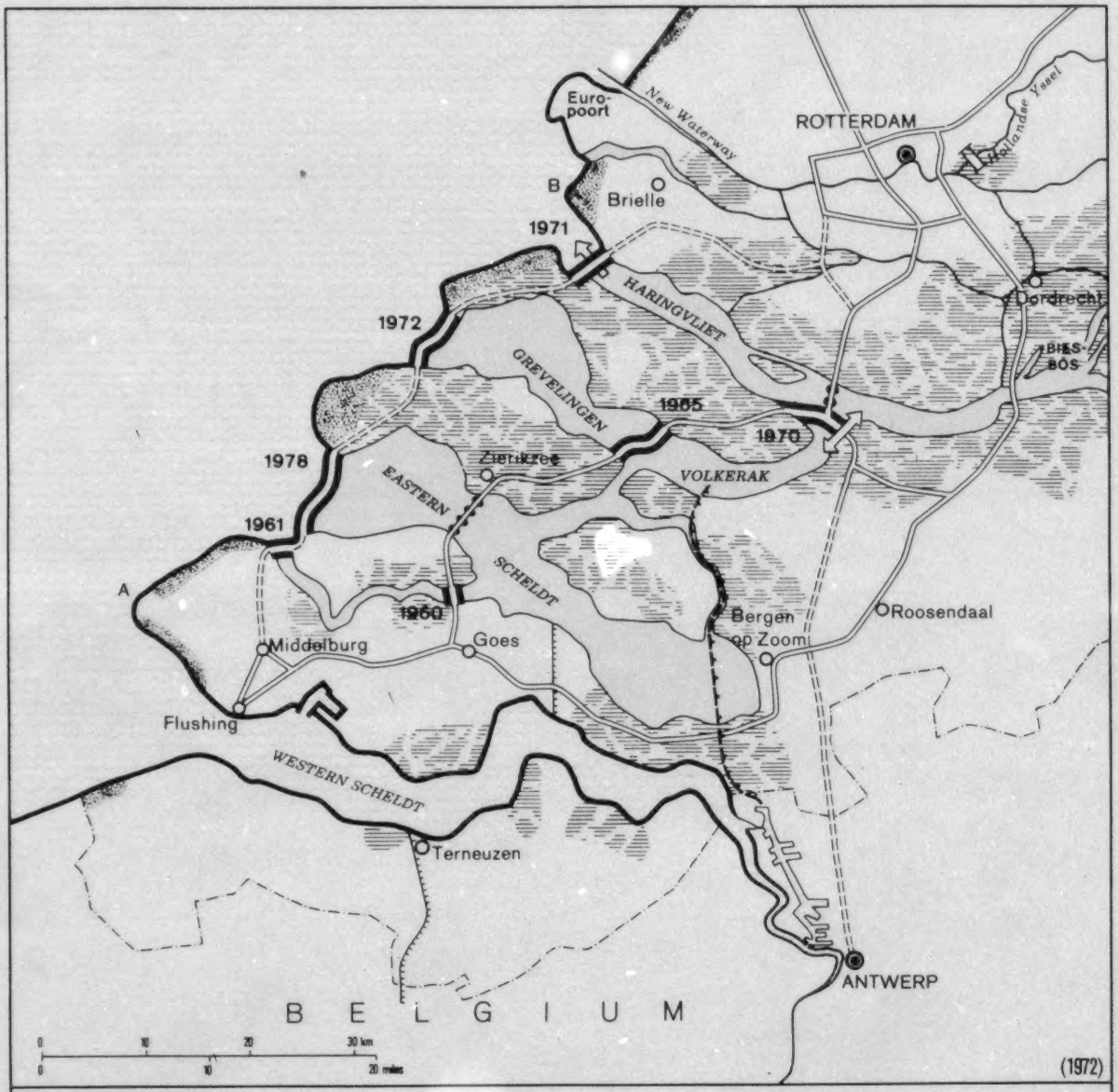

WADDEN SEA
BARRIER DAM 19 miles
1927-1932
WIERINGEN
Wieringerwerf
WIERINGERMEER
1927-1930
50,000 acres
LAKE YSSEL
300,000 acres
FRIESLAND
ANDIJK EXPERIMENTAL POLDER
100 acres
1927
Enkhuizen
NORTH HOLLAND
Hoorn
MARKERWAARD
1963-1980
?
Volendam
Marken
Amsterdam
NORTH-EAST POLDER
1937-1942
Emmeloord
-15
120,000 acres
Urk
-16.5
EAST FLEVOLAND
1950-1957
Dronten
Lelystad
135,000 acres
Ysselmeer
Kampen
SOUTH FLEVOLAND
1959-1968
105,000 acres
Harderwijk
1920 Coastline
Dyke
Dyke under construction
Pumping station
-15
Lowest point below mean sea level, in metres
Sluice + lock
Permanent connection, also sluice
Bridge
Fresh water
Salt water
(1972)
0 5 10 15 20 25 km
0 5 10 15 miles
PROVISIONAL PLAN FOR THE LAYOUT OF SOUTH FLEVOLAND
Urban zone
Industrial zone
Woodland, recreation area and nature reserve
Main road
Railway line
BARRIER DAM
300 ft.
+25 ft.
WADDEN SEA
Road
LAKE YSSEL
N.A.P.
-20 ft.
MARKERWAARD
EAST FLEVOLAND
Almere

The Delta project

The 1953 disaster
The implementation of the Delta Project was hastened by the great floods which struck the south-west of the Netherlands on 1 February 1953 (1,800 dead; 160,000 ha of land flooded).
The Project aims not only to reduce the danger of flooding through the building of a number of dams, but also envisages a general review of water economy and improved road links with the islands.

The Delta Project
As early as 1950, the Brielse Maas was cut off from the sea by means of a dam. The first work to be completed after the 1953 disaster was the construction of a movable flood barrier across the Hollandse Yssel to the east of Rotterdam. If, when the Delta dams are completed, there should be a tidal wave in the New Waterway (left open as the main shipping channel to the port of Rotterdam) driven inland by a storm, this flood barrier will serve to protect a great part of the polder land in the west of the Netherlands.
As the time schedule on the map shows, all the secondary, inland dams have now been completed, while of the primary dams which will serve to keep out the sea, only the largest one—the one in the Eastern Scheldt—has still to be finished. The dykes along the New Waterway and the Western Scheldt, which are being left open, are being strengthened. (Originally, consideration was given to strengthening all 700 kilometres of sea dyke in the Delta area, thus dispensing with the need for costly barrier dams. Preference was given to the present Delta Project, however, which not only guarantees a greater measure of security, but also offers more additional advantages.)
Numerous new techniques have been developed in the sealing off of the sea-arms, e.g. the closure of the last gaps by means of caissons, giant concrete structures, each as large as a block of flats, which float on the water and have lifting doors on the fore and rear sides. The caissons are sunk into position, whereupon all the lifting doors are lowered simultaneously and the caissons are filled with sand. The remainder of the dam is then built over them. In the case of other dams, the final gaps were closed by dumping concrete blocks with the aid of a cableway.

Consequences
In this way, the sea is being banished from the waters along the coast of the south-west Netherlands. Over against the great advantage of reduced flood hazard stands the drawback that coastal fishing (mussels, shimps) and the very old oyster farms are disappearing. Biologists, too, deplore the changes taking place in flora and fauna in, say, the Biesbos, that formerly unique freshwater tidal swamp, as a result of the cessation of tidal movement.
On the other hand, there are advantages which offset these drawbacks: the fresh water reservoirs that form behind the dams will counter the salination of agricultural land and are already opening up new possibilities for aquatic sport and the supply of drinking water. Moreover, the new roads in the Delta region—one over the primary dams and one over the secondary ones, plus the Haringvliet bridge and the five kilometre long Zeeland bridge across the Eastern Scheldt—mean that the islands will be less isolated.
This can be expected to result in far-reaching changes in the Delta region, which up to now has been mainly agricultural. It is assumed that industry and trade will develop, especially in a horse-shoe around the Delta region—to the north, in the Rotterdam-Europoort area, to the east along the new roads and waterways between Rotterdam and Antwerp, and to the south, along the Western Scheldt (where industries are already developing near Flushing and Terneuzen).
The centre area will for the time being retain its agricultural function, and provide recreational facilities along the sea-coast—with its broad dunes—and on the inland lakes for, among others, the inhabitants of the West Holland conurbation.



Dam
Storm surge barrier
Projected canal
Outlet sluice
Arterial road
Projected arterial road
Bridge
Shipping lock
Salt water
Future fresh water
Dunes
Flooded in 1953

REDUCTION IN DISTANCE BY ROAD

Distance Rotterdam-Flushing before Delta Project (via Roosendaal): 150 km

Distance Rotterdam-Flushing after Delta Project (via Zierikzee): 110 km

SHORTENING OF COASTLINE

Length of coastline A - B before Delta Project: 800 km

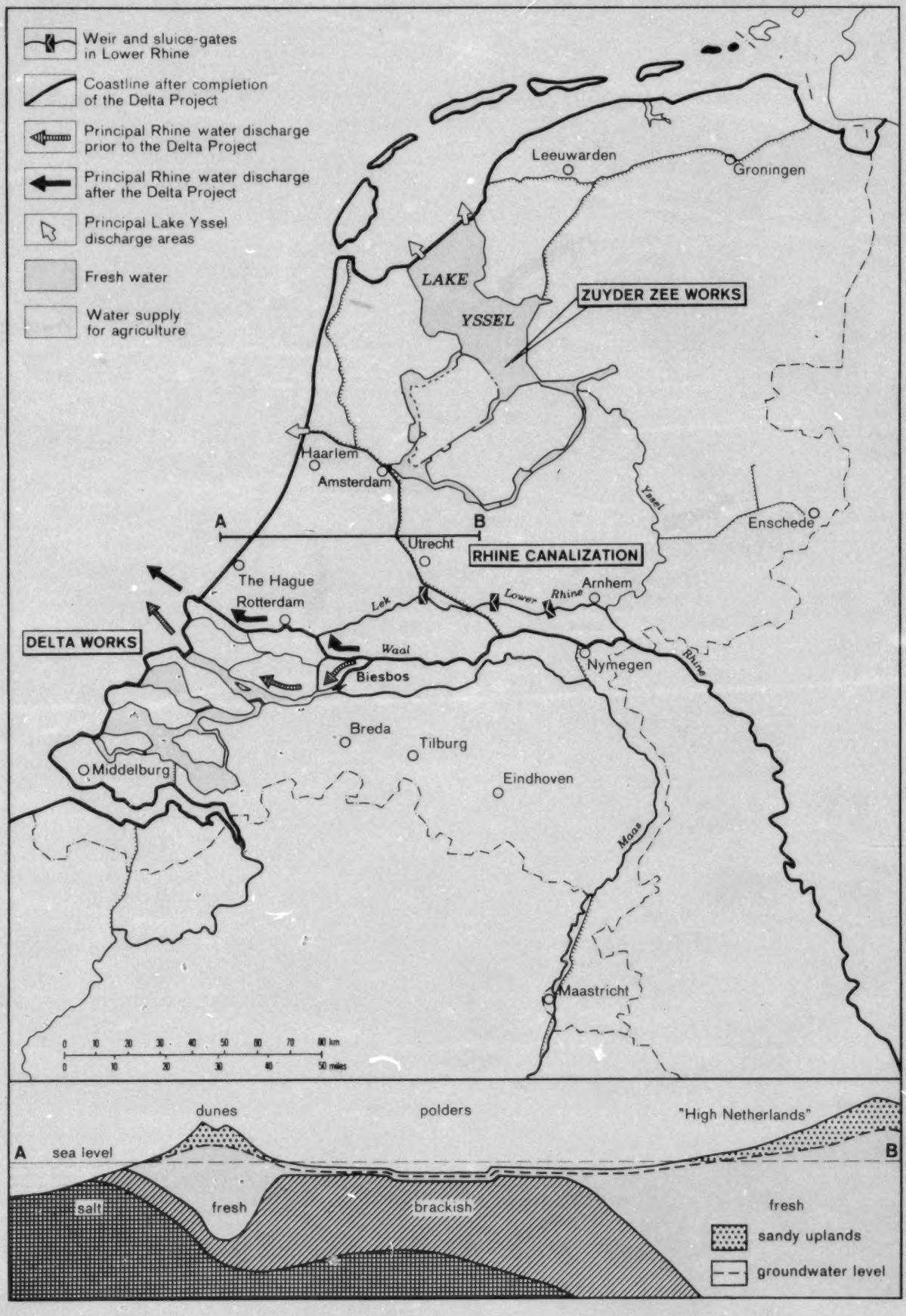
Length of coastline A - B after Delta Project: 80 km

Water control

General
Sound water management is essential in the Netherlands, with its large areas of water and dense population. Control not only of the rivers and lakes but also of the groundwater makes it possible to achieve many objectives, including the supply of drinking water, reduction of excess water, control of salination, supply of water for agricultural purposes and the securing of navigation channels of adequate depth.

Canalisation of the Rhine
In this respect the Zuyder Zee and Delta Projects play an important part in that they afford a greater measure of security and have made possible the formation of fresh-water reservoirs, the water levels of which can be controlled.
To these must be added a third project—the canalisation of the Lower Rhine. Here, three locks with sluices have been constructed to a completely new design: the water can be held back by two semicircular, movable 'visor gates', which allow ships to pass through underneath when the gates are raised.
The most easterly of the dams allows more water to flow through the Gelderse Yssel to Lake Yssel, which is of benefit to shipping on the Yssel and to farmers in the north and east of the Netherlands. In itself, however, this would reduce the amount of water flowing through the Lower Rhine and the Lek past Rotterdam to the sea to such an extent as to make navigation impossible. Moreover, the salt water, which at high tide already flows inland to beyond Rotterdam, would be able to penetrate even further. To combat the first evil, two more locks have been built downstream; in order to counteract salination, the waters of the Maas and the Waal have been cut off from the northern Delta and forced to flow past Rotterdam to the sea.

Drinking water
Drinking water supplies in the polderland of the Low Netherlands require special care; the cross-section shows how the continual pumping of the water out of the polders enables brackish and salty groundwater to penetrate to close below the surface. This means that, unlike in the High Netherlands and the dune areas, groundwater cannot be used for drinking purposes. This leaves surface water, which is becoming increasingly subject to pollution, particularly when drawn from the rivers.
Besides endeavours to eliminate the causes of this river pollution by means of international agreements, various attempts are being made in the Netherlands to combat the effects. This involves not only the use of the usual purification processes, but also the conservation of water especially at times when the river levels are high (i.e. when pollution is less concentrated), chiefly by allowing it to filter into the dunes and (in the future) into the sandy soil of the High Netherlands, and by storage in reservoirs, both man-made and natural. Such reservoirs have been constructed in the Biesbos and are to be built in other places.


Weir and sluice-gates in Lower Rhine
Coastline after completion of the Delta Project
Principal Rhine water discharge prior to the Delta Project
Principal Rhine water discharge after the Delta Project
Principal Lake Yssel discharge areas
Fresh water
Water supply for agriculture
Leeuwarden
Groningen
LAKE YSSEL
ZUYDER ZEE WORKS
Haarlem
Amsterdam
Yssel
Enschede
A
B
Utrecht
RHINE CANALIZATION
The Hague
Rotterdam
Lek
Lower Rhine
Arnhem
DELTA WORKS
Waal
Biesbos
Nymegen
Rhine
Breda
Tilburg
Middelburg
Eindhoven
Maas
Maastricht
0 10 20 30 40 50 60 70 80 km
0 10 20 30 40 50 miles
dunes
polders
"High Netherlands"
A
sea level
B
salt
fresh
brackish
fresh
sandy uplands
groundwater level

Demography

Population growth

Since the year 1830, when the first census was held (2.6 million), the population of the Netherlands has increased fivefold to around 13.3 million (1973). Immigration accounts for a very small part of this increase; far and away the largest part must be ascribed to natural growth of the population.

The graph shows the trend in the birth and mortality rates since 1900. The birth rate fell from 31.6 per thousand in 1900 to 16.1 per thousand in 1972, a reduction due mainly to a drop in the size of families; the mortality rate dropped from 17.9 per thousand in 1900 to 8.5 per thousand in 1972, owing to improvements in medical services, social conditions and hygiene. The infant mortality rate dropped particularly sharply. (No account has been taken of temporary marked increases in the birth rate after, and the mortality rate during the two World Wars.) In recent years the mortality rate has risen slightly as a result of a relative increase in the highest age groups.

Present calculations, based mainly on a continuing drop in the birth rate, put the official estimate of the number of inhabitants of the Netherlands in the year 2000 at 15-16 million.

Age distribution

In addition to the total number of inhabitants, their age distribution is also significant. The 1970 population pyramid shows a somewhat uneven composition, particularly due to the effect which the two World Wars had on the birth and mortality rates.

The situation in 1970 was that the 25 to 30 age-group was somewhat sparsely represented, while the 20-25 age-group was very large due to the 'bulge' in the birth rate of the years following the war. Moreover, the increase in the average expectation of life (in 1971, 71 years for men and 77 for women) means there are a relatively large number of old people; on 1 January 1972, 10.3 % of the population were aged over 65.

The creation of study opportunities and employment for the large numbers of young people calls for considerabe facilities and investment; the same is true of the pensions, housing, etc., required for elderly people.

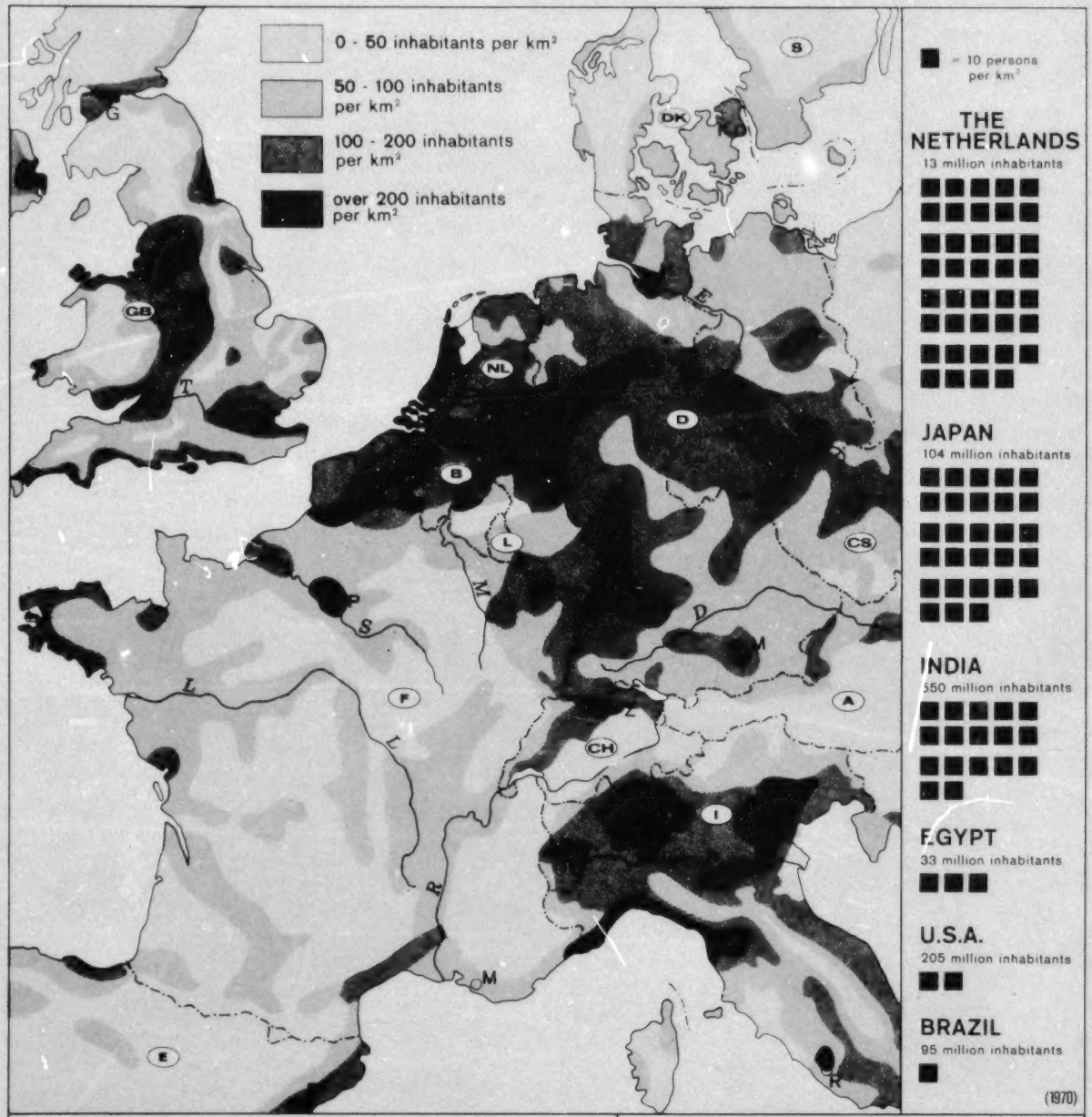
Population density

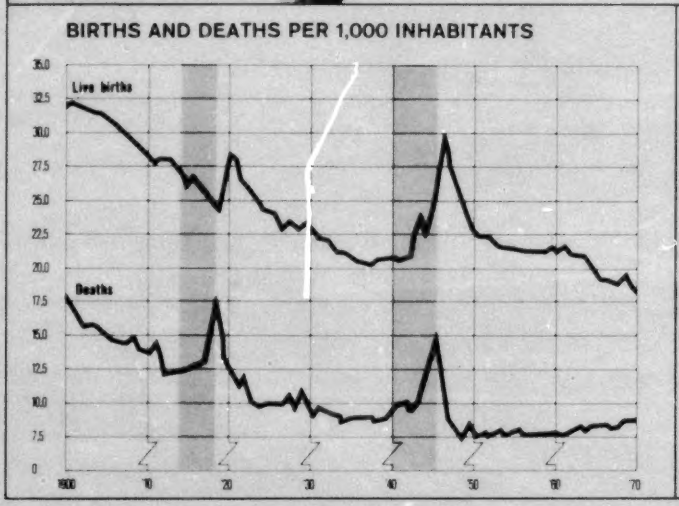
With 396 inhabitants per km² (as at 1 January 1973), the Netherlands is one of the world's most densely populated countries. The map shows how the country adjoins other densely populated areas in north-west Europe.

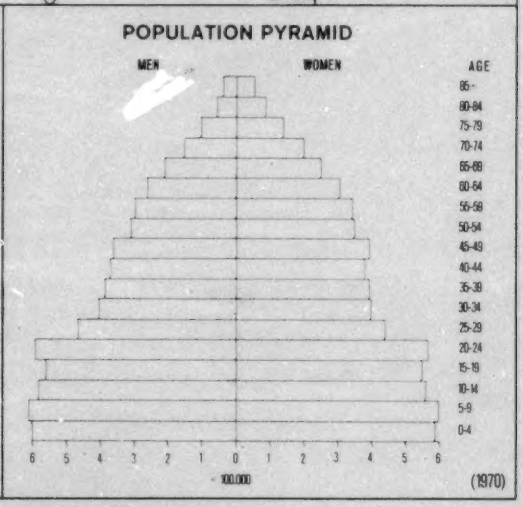
At the same time the favourable situation of the country, lying as it does on the North Sea and at the estuaries of important rivers, is at once evident. Taking advantage of this, the Dutch have developed commerce and industry so that the country enjoys a high standard of living despite its population density.

For comparison purposes, the population density of five other countries is given. In considering the question of whether a country is over-populated, it is not enough to consider the number of inhabitants per km²; account must also be taken of the production potential available and the extent to which it is exploited.

In the sense that the means of subsistence are inadequate for the number of inhabitants, there can be no question of the Netherlands being over-populated. However, there is some justification for speaking of over-population in the physical sense, as evidenced by the housing shortage, the scarcity of space for recreation, traffic congestion, environmental pollution, etc.


0 - 50 inhabitants per km²
50 - 100 inhabitants per km²
100 - 200 inhabitants per km²
over 200 inhabitants per km²
= 10 persons per km²
THE NETHERLANDS
13 million inhabitants
JAPAN
104 million inhabitants
INDIA
550 million inhabitants
EGYPT
33 million inhabitants
U.S.A.
205 million inhabitants
BRAZIL
95 million inhabitants
(1970)
S
DK
IRL
GB
NL
D
B
L
CS
F
A
CH
I
E
P
M
R


BIRTHS AND DEATHS PER 1,000 INHABITANTS
Live births
Deaths
35.0
32.5
30.0
27.5
25.0
22.5
20.0
17.5
15.0
12.5
10.0
7.5
0
1900
10
20
30
40
50
60
70


POPULATION PYRAMID
MEN
WOMEN
AGE
85-
80-84
75-79
70-74
65-69
60-64
55-59
50-54
45-49
40-44
35-39
30-34
25-29
20-24
15-19
10-14
5-9
0-4
6 5 4 3 2 1 0 1 2 3 4 5 6
100.000
(1970)

Distribution of the population

Urbanisation

The population of the Netherlands is not distributed evenly over the country. As the population increased and the effects of mechanisation made themselves felt in agriculture, an increasing drift to the cities took place. On 1 January 1973, no less than 81 % of the population lived in municipalities with over 10,000 inhabitants. Since from the earliest times the principal cities have been founded mainly in the western coastal provinces, with their favourable location, urbanisation in the Netherlands for many years took the form of migration from all parts of the country to the west. Forty-six per cent of the entire population live in the provinces of North Holland, South Holland and Utrecht, which together account for no more than 21 % of the area of the Netherlands. Here the expanding cities, encroaching on the open country between them, have formed the horseshoeshaped 'West Holland conurbation'.

The industrial towns which grew up later in regions other than the west are more scattered, e.g. Groningen in the north, Arnhem and Enschede in the east, Eindhoven and Maastricht in the south.

Regional dispersal

In recent years, however, there have been signs of a reversal of this urbanisation trend. The large cities in the west are full to overflowing; there are more people leaving than settling there. The growth is shifting to the smaller localities round about, and, failing that, to areas adjoining the West Holland conurbation, in the direction of Breda, Tilburg and Eindhoven, or Arnhem and Apeldoorn.

As a result, the highest growth rates are at present encountered in the east and south of the country, while the rate of growth in the west is below the national average (and that despite the immigration of many thousands of foreign workers each year from many lands including the Mediterranean countries).

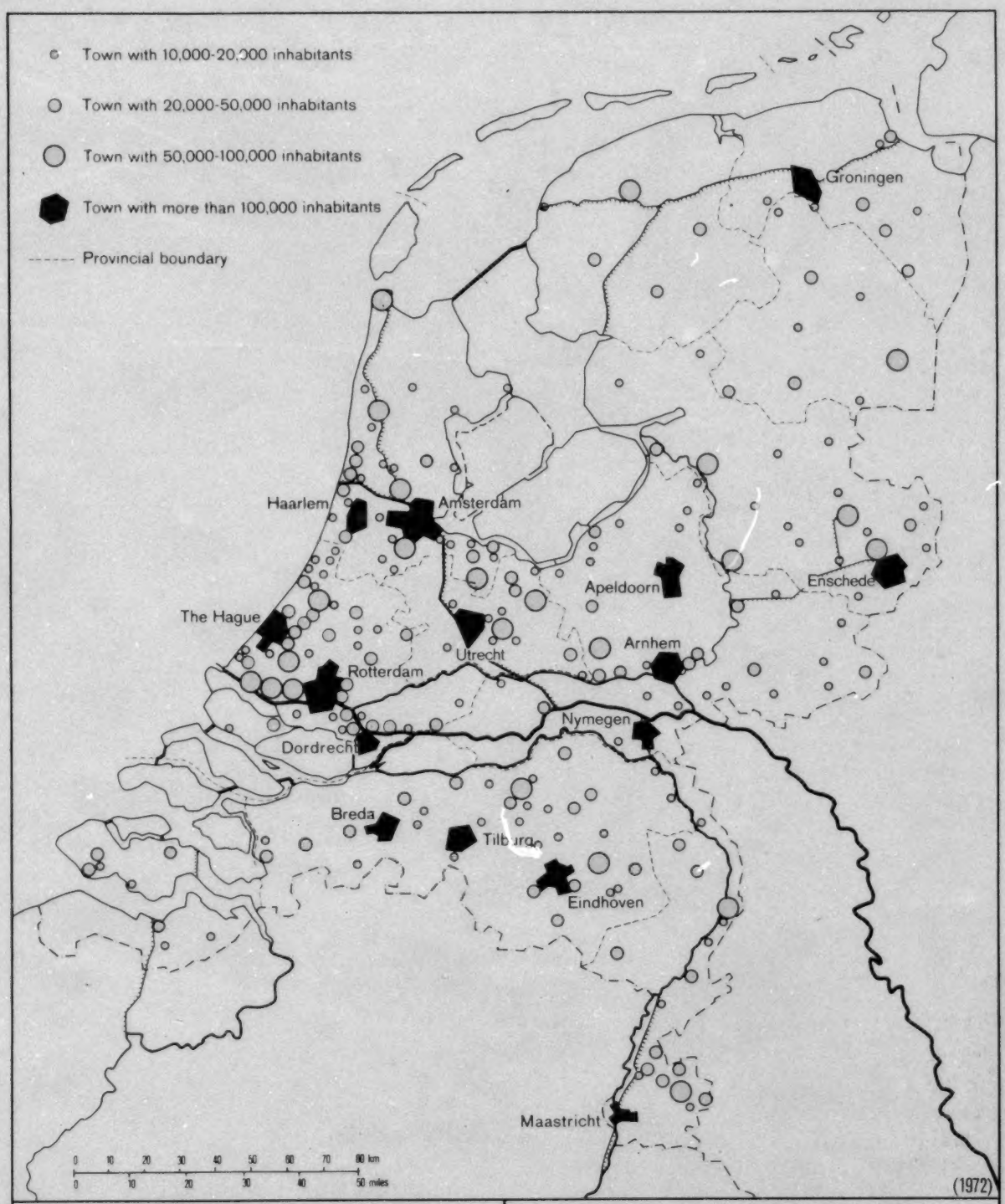
The north of the country is distinctly lagging behind; the population density and the rate of growth there are low, and there is a danger that this part of the country will fall behind the rest from the economic point of view as well.

Statistics

The Table below shows the differences in population density and growth rate for the provinces and the four regions.

1.1.73	area in km²	population x 1,000	No. of inhabitants per km²	growth rate since 1.1.68
N. Nederlands	*8,313*	*1,456.0*	*175*	*5.7 %*
Groningen	2,326	530.4	229	3.6
Friesland	3,339	539.2	161	5.5
Drenthe	2,648	386.4	146	9.1
E. Netherlands	*9,773*	*2,558.4*	*262*	*8.3*
Overyssel	3,801	956.3	252	6.7
Gelderland	5,011	1,580.0	315	8.5
S. Ysselmeer polders	961	22.1	23	110.5
W. Netherlands	*8,644*	*6,460.0*	*747*	*4.1*
N. Holland	2,657	2,283.4	860	3.0
S. Holland	2,868	3,018.9	1,053	3.3
Utrecht	1,329	838.4	631	9.1
Zeeland	1,790	319.3	178	7.0
S. Netherlands	*7,081*	*2,910.1*	*411*	*7.3*
N. Brabant	4,913	1,879.8	383	9.0
Limburg	2,168	1,030.2	475	4.5
The Netherlands *	33,810	13,387.6	396	5.7

* Area excluding stretches of water broader than 6 metres; number of inhabitants including bargees and others with no fixed address whose names are entered in the Central Register of Persons.

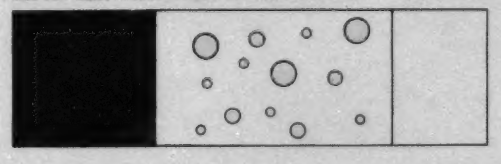


OF THE NETHERLANDS POPULATION

29% lives in towns with more than 100,000 inhabitants

52% in towns with between 10,000 and 100,000 inhabitants

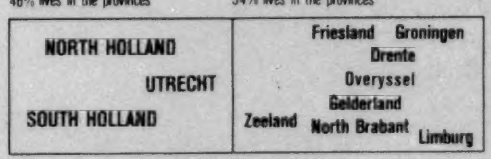
19% in towns with under 10,000 inhabitants



OF THE NETHERLANDS POPULATION

46% lives in the provinces

54% lives in the provinces



The West Holland conurbation

Origin

The two small maps show how in little over a century the towns and villages in the west of the Netherlands have spread towards each other to form a single large, horse-shoe urban area enclosing a central, agricultural area, known as 'the green heart' of the West Holland conurbation. The bar diagrams show that the percentage of the total population accounted for by the West Holland conurbation has risen considerably since last century.

The essential difference between the West Holland conurbation and, say, London or Paris is that in the conurbation the traditional functions of the metropolis—government, industry and services—have not been concentrated in a single centre, but have been distributed over a number of cities.

As early as the 17th century it was possible to discern the four cities in the area which were later to form the focal points of the conurbation: Amsterdam, The Hague, Rotterdam and Utrecht. Amsterdam and Rotterdam owe their existence and growth—each in its own way—mainly to their favourable location. These cities have long formed points of access to the European hinterland and have therefore developed principally as trade and industrial centres. The Hague is the seat of the national government, whereas Amsterdam is the country's capital. Utrecht, situated more centrally, is a major road and rail junction where routes between all parts of the Netherlands intersect, and is therefore ideally situated as a centre for annual fairs and congresses, etc.

Further growth

The Government's concern for the West Holland conurbation centres on two main problems: how to guide the future growth of the conurbation, and how to secure good living conditions there, both in the short and the long term.

As has already been pointed out, the numbers of those leaving the large cities exceed the number of arrivals and growth has shifted to smaller localities. The Government proposes, where possible, to deflect such growth to areas outside the horse-shoe shaped conurbation, *e.g.* North Holland, the Lake Yssel polders, eastern Utrecht and Gelderland, North Brabant and the Delta region.

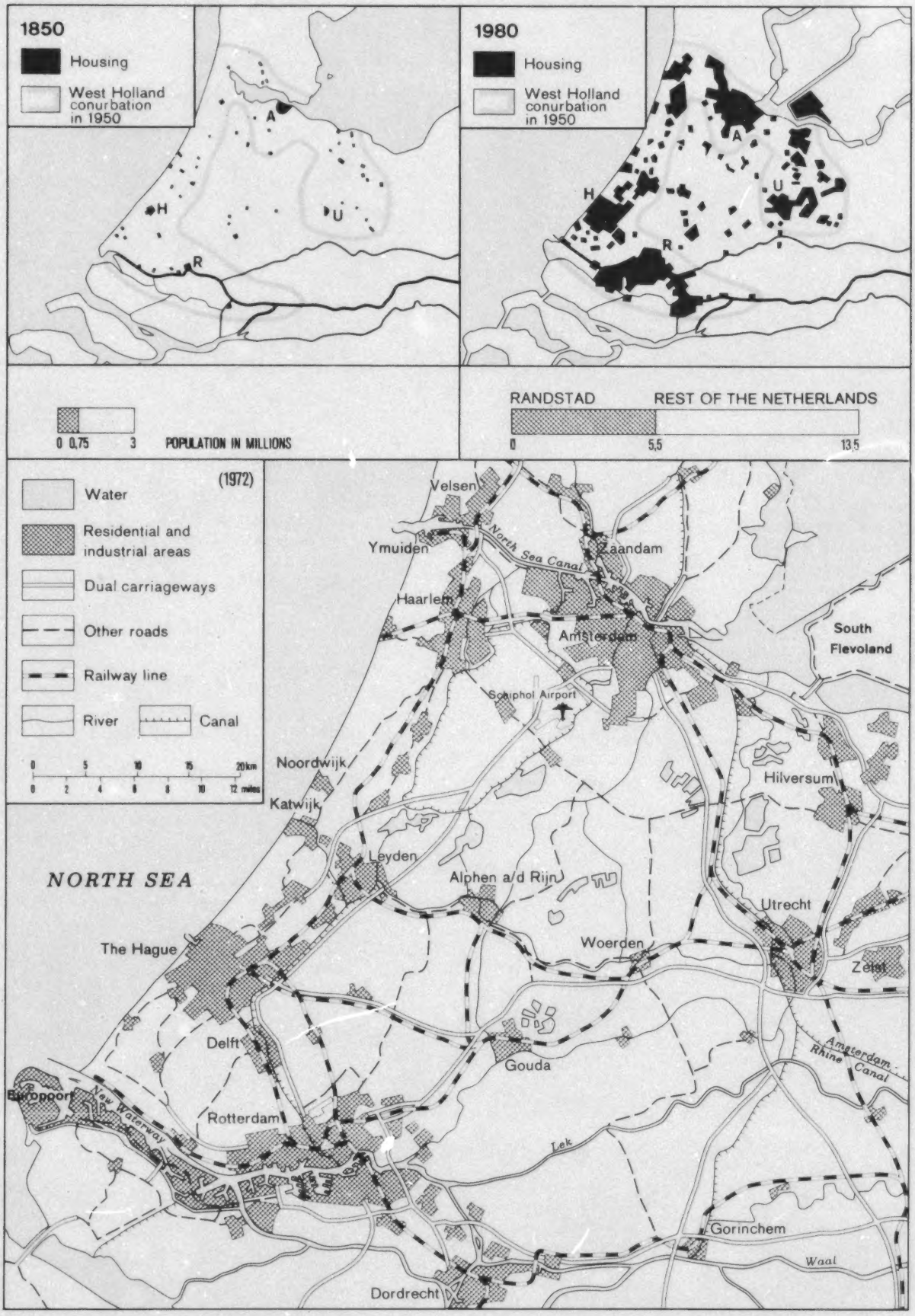
Great care is being taken to ensure that the places do not coalesce (as has already happened in places, *e.g.* in The Hague agglomeration), and that 'the green heart' does not lose its agricultural and recreational functions. This has proved in practice to be a very difficult task. The large map shows the very close network of infrastructural links within the conurbation. It is difficult to slow down the growth of places occupying favourable positions within this network (*e.g.* Gouda, Alphen, Woerden).

Physical over-population

Another problem results from the physical over-population which in various ways threatens to adversely affect the quality of life.

Many towns are faced with housing problems (the number of commuters in the conurbation is rising rapidly), there is serious traffic congestion, particularly in the cities during the rush hours (Rotterdam was the first Dutch city, in 1968, to put a stretch of underground railway track into operation), there is a severe shortage of space for recreational purposes in and immediately adjoining the West Holland conurbation (with the exception of the stretches of water, the agricultural polder land of the 'green heart' is not suited to mass recreation) and the effect on the environment (water, air and soil pollution and noise) is in places assuming serious proportions.

The Rotterdam agglomeration suffers most: for its drinking water it has to make do with purifying the heavily polluted waters of the Rhine, and a number of industries west of the city (including Europoort) regularly cause serious air pollution owing to the prevailing west winds. Some 23 municipalities in the area have joined together to form a regional association ('Rijnmondraad') to fight this contamination of the environment.


1850
Housing
West Holland conurbation in 1950
A
H
U
R
1980
Housing
West Holland conurbation in 1950
A
H
U
R
0 0,75 3
POPULATION IN MILLIONS
RANDSTAD
REST OF THE NETHERLANDS
0
5,5
13,5
(1972)
Water
Residential and industrial areas
Dual carriageways
Other roads
Railway line
River
Canal
0 5 10 15 20km
0 2 4 6 8 10 12 miles
NORTH SEA
Velsen
Ymuiden
North Sea Canal
Zaandam
Haarlem
Amsterdam
South Flevoland
Schiphol Airport
Noordwijk
Katwijk
Leyden
Alphen a/d Rijn
Hilversum
Utrecht
The Hague
Woerden
Zeist
Delft
Gouda
Amsterdam Rhine Canal
Europoort
New Waterway
Rotterdam
Lek
Gorinchem
Waal
Dordrecht

The economy

The working population

The Netherlands was for a long time a country with a distinctly agricultural character; almost up to the year 1900 there were still as many agricultural workers in the population as industrial workers. As the population density increased, it became more and more difficult to retain these proportions and ensure adequate employment, a reasonable standard of living and equilibrium in the balance of payments.

Far-reaching changes in the economic structure, partly in the form of major shifts in the distribution of the working population, had become necessary. The circular diagrams in the left-hand column show that at first—*i.e.* from the beginning of the twentieth century until after the Second World War–this meant mainly a shift from the agricultural sector to the industrial one.

The bar diagrams show that at the beginning of the twentieth century the number of persons engaged in agriculture was still capable of increasing, because there was still plenty of land to prepare for cultivation. But soon the area of new agricultural land grew smaller (apart from the Lake Yssel polders), mechanisation became more widespread and–particularly in the last few decades—there have been manifest attempts to increase the size of farms. At the same time, land is constantly being withdrawn from agricultural uses for urban expansion, road building, etc.

All this has led to a steady drop in the percentage of agricultural workers, and later to a drop in absolute terms.

A steady growth is observable in the number of employees in industry; compared with the surrounding countries, industrialisation began fairly late in the Netherlands, and its development was slow during the two world wars and the economic crisis in between. After 1945 the pace of industrialisation accelerated. It is striking that since 1960 the percentage of workers in the industrial sector has dropped somewhat. This is mainly due to rapidly increasing mechanisation and automation. The most remarkable growth is observable in the tertiary sector (trade, transport and other services, including the civil service, local government and education), which now absorbs the energies of more than half the working population.

Employment

When we examine the question whether in this way employment is assured for the entire working population, regional differences at once spring to light.

Unemployment is above the national average in the northern provinces in particular; in the west, on the other hand, for years now there has been a large annual (though temporary) immigration of tens of thousands of foreign workers, especially from Mediterranean countries, which helps to meet the need for semi-skilled workers.

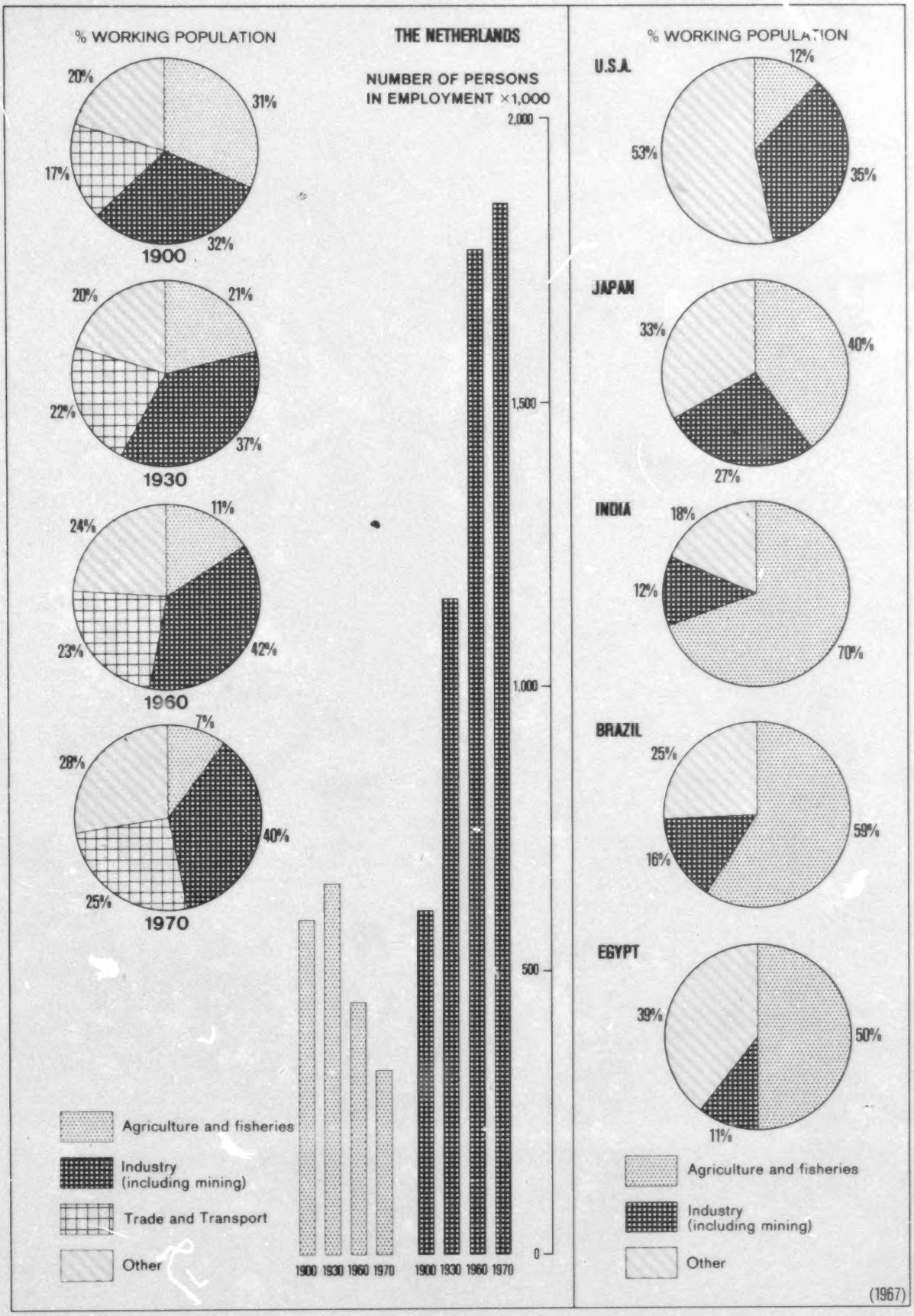
The balance of payments

To achieve a favourable balance of payments is another problem, which, as has already been said, calls for constant attention in the Netherlands.

A small and densely populated country possessing few natural resources is of course forced to import a considerable range of goods. Owing to the changes in the economic structure and the constant endeavours to increase productivity described above, it has proved possible to export more goods as well (see the Table below and also pp. 34/35). However, the value of exports does not cover that of imports: in recent years the percentage of coverage has fluctuated around the 90 mark.

Attempts are being made, with varying success, to use the excess on the services balance of payments, obtained partly by supplying transport services to other countries, to compensate for the deficit on the trade balance of payments.

Index figures (1963 = 100)	1970
Number of inhabitants	109
Productivity (total)	145
— Agriculture and fisheries	180
— Trade and industry	165
— Services sector	119
Imports (quantity)	204
Exports (quantity)	224
Consumption (quantity)	153


% WORKING POPULATION
20%
31%
17%
32%
1900
20%
21%
22%
37%
1930
24%
11%
23%
42%
1960
28%
7%
25%
40%
1970
THE NETHERLANDS
NUMBER OF PERSONS IN EMPLOYMENT ×1,000
2,000
1,500
1,000
500
0
1900 1930 1960 1970
1900 1930 1960 1970
Agriculture and fisheries
Industry (including mining)
Trade and Transport
Other
% WORKING POPULATION
U.S.A.
12%
53%
35%
JAPAN
33%
40%
27%
INDIA
18%
12%
70%
BRAZIL
25%
59%
16%
EGYPT
39%
50%
11%
Agriculture and fisheries
Industry (including mining)
Other
(1967)

International cooperation
All this shows quite clearly the extent to which the economy of the Netherlands is bound up with that of other countries. It is quite obvious, then, why the Netherlands has always been a staunch advocate of international economic cooperation in, for example, Benelux and the EEC.

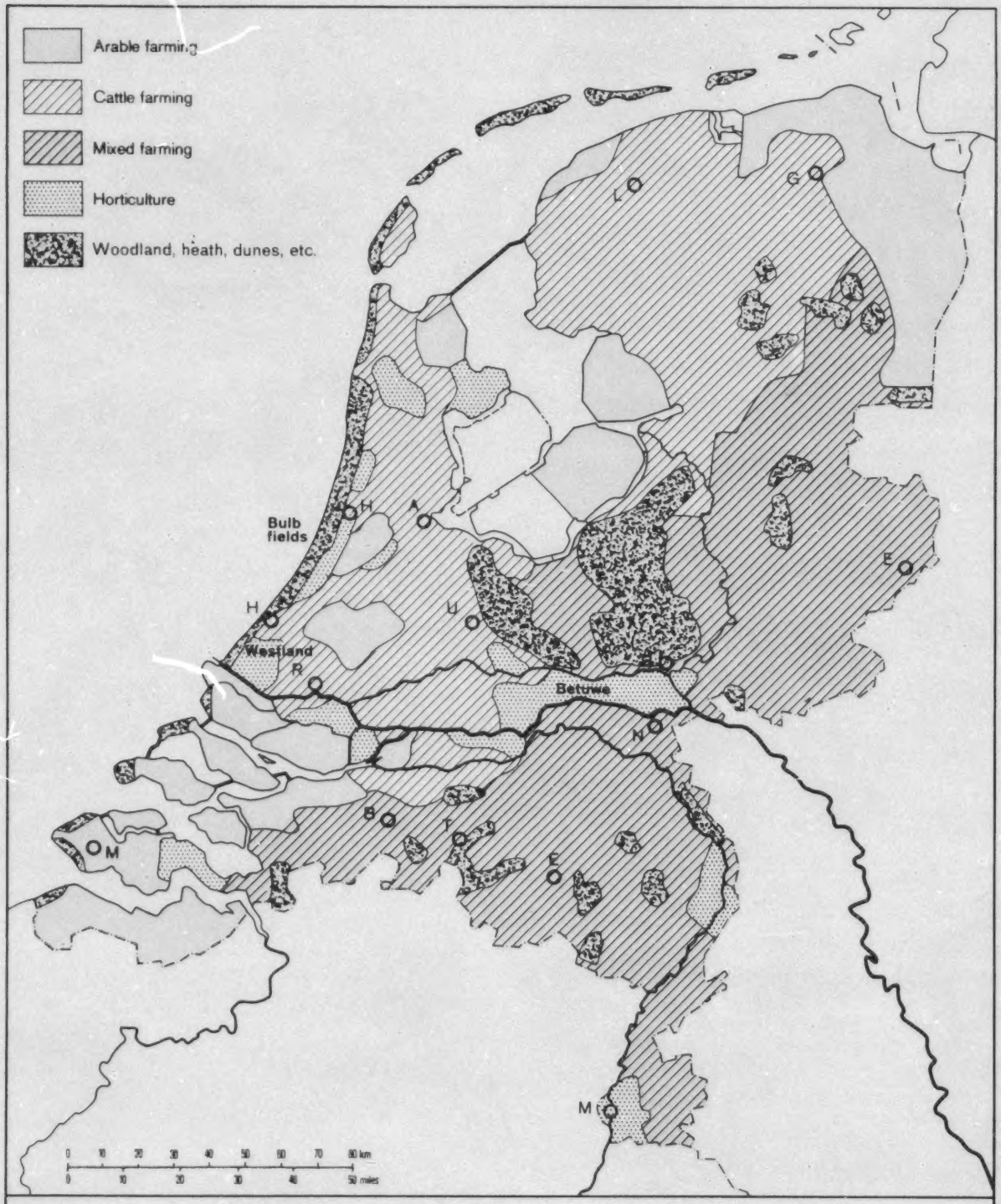
Still, the darker side of the picture—the resultant, ever-increasing foreign competition—must not be overlooked; the closure of businesses in the horticultural and textile industries, which have been common in the last few years, must be viewed largely as a consequence of such competition.

Agricultural means of support

Land use
As can be seen from the bar diagram, over 70 % of the Netherlands is cultivated land, of which almost two-thirds is grassland. Woods and waste land together account for 15 % of the area of the Netherlands, and there is a tendency for all these areas to shrink owing to the sharp rise in the amount of land used for urban development and roads (increase of 40 km² between 1930 and 1960, 800 km² between 1960 and 1970!). Since increasing importance is being attached to nature conservation and recreation, however, endeavours are being made to keep to a minimum the loss of such land as is important on these scores; indeed, it is government policy to increase the amount of land under wood. This means that some loss of cultivated land is unavoidable.

Agricultural areas
The regional distribution of the various forms of land use is shown on the map. Regional differences are explained mainly by such factors as soil type and water economy.
Arable farming is encountered mainly on fertile, well-drained sea-clay land, such as is to be found in the north and south-west of the Netherlands, in the drained areas in the west, and in the Lake Yssel polders.
The most important products are cereals, potatoes and sugar-beet; the farms are fairly large by Dutch standards (more than 25 ha) and highly mechanised. The amount of bread grain produced is insufficient to meet domestic requirements; approximately two-thirds of total needs must be met by imported wheat.
Livestock farming is encountered mostly on low-lying clay and peat soils, which are in the main too moist to support arable farming. Here, dairy farming predominates, the most important products being milk (for the large cities) and dairy produce (for both domestic and foreign markets). Increasing use is being made of mixed feed, the demand for which has given rise to a rapidly growing industry which imports large quantities of fodder grain.
Mixed farming has long been established on the sandy soils in the east and south of the Netherlands. Here, the emphasis on livestock farming has become steadily more pronounced; in addition to cattle farming we find pig and poultry farming. Here, too, we find home-grown fodder crops giving way to mixed feed.
Horticulture flourishes in many areas. Both physical and economic considerations (the possibility of finding markets at home and abroad) account for the regional distribution. Many orchards are found along the rivers, especially in the region known as the Betuwe, behind the dunes to the south of Haarlem are the famous bulb fields, and in the other areas indicated on the map various types of vegetables, fruit, flowers and plants—particularly tomatoes, cucumber and lettuce—are produced. Some of the vegetables are cultivated in heated glass-houses, particularly in the Westland, south of The Hague. A substantial proportion of the cut flowers grown in the area south of Amsterdam find their way abroad via nearby Schiphol airport; a large quantity of vegetables and fruit from the area along the Meuse in central Limburg finds its way to the Ruhr in Germany.

Importance of agriculture
The part played by agricultural sectors in the Dutch economy has changed radically in the last century. When, towards the end of the 19th century, Dutch agriculture was confronted with cheap agricultural products imported from abroad (including cereals from North America), a change-over began, which is basically still in progress. The change-over consists in reducing or ceasing the production of products which foreign countries can supply more cheaply, and specialising instead in quality products suitable for both the domestic and export markets.



LAND USE IN THE NETHERLANDS

ARABLE LAND 22%	HORTICULT. 4%	GRASSLAND 43%	WOODLAND, HEATH, DUNES, ETC. 13%	BUILDINGS, ROADS, WATER, ETC. 18%

(1971)

As a result, over 25 % of total Dutch exports are made up of raw or processed agricultural products whose value exceeds that of agricultural imports! At the same time, constant efforts are being made to step up production both per hectare and per man. It is in this light that we must view the countless land consolidation schemes either completed or in progress throughout the country. As a result of these schemes, the size of farms and holdings is being increased and the number of agricultural workers reduced, in the interests of more efficient management. Only in this way can Dutch agriculture continue to hold its own both in the Netherlands and in the EEC.

Mining

History
Till late in the 19th century it was believed that the soil of the Netherlands held little in the way of minerals. It was known that the soil of South Limburg contained coal and marl, but neither State nor private enterprise showed much interest in exploiting these resources in a part of the country remote and, at that time, difficult of access.

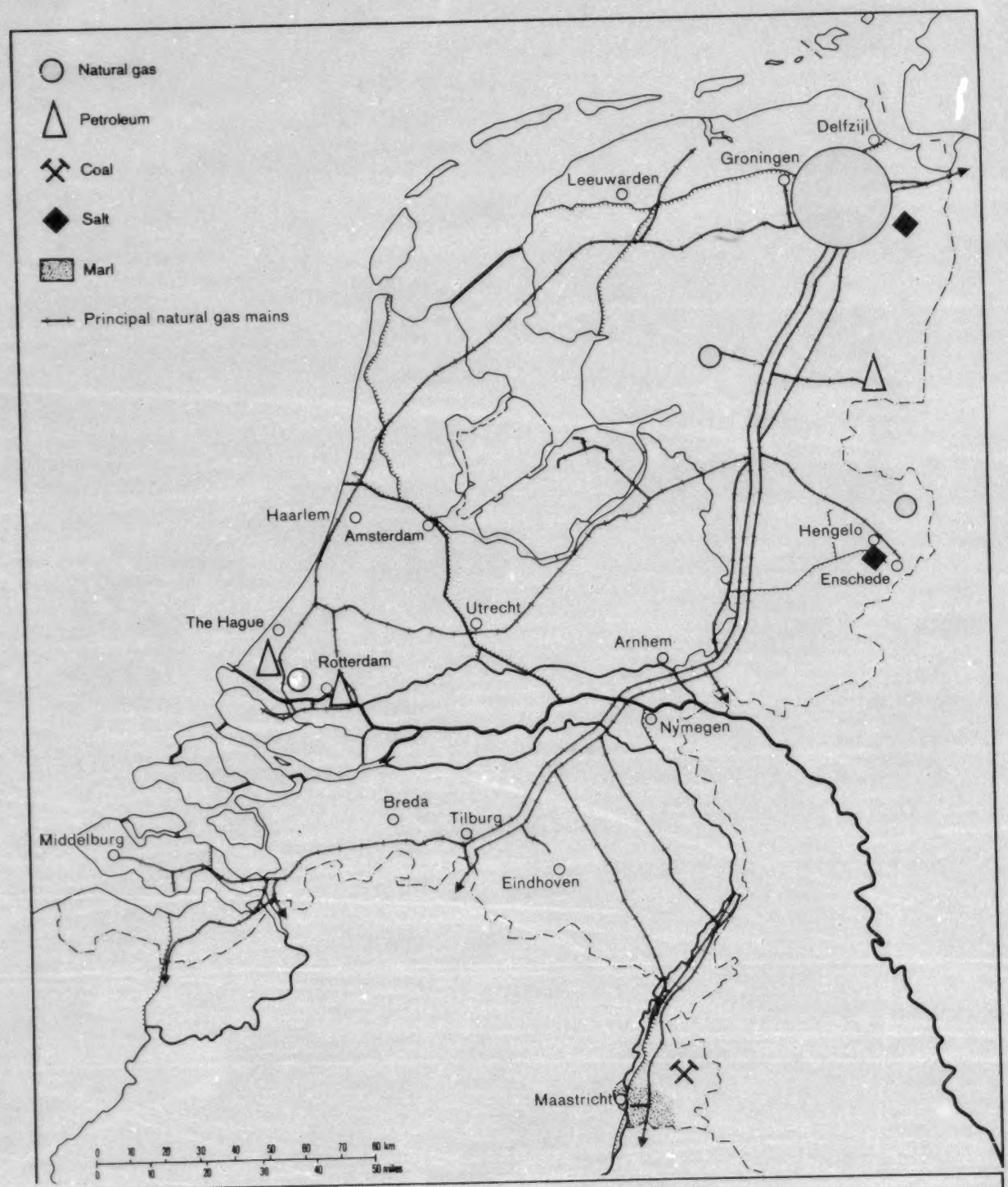
Coal
About the turn of the century, however, when the need for industrialisation became clear, increasing interest was shown in coal, and twelve mines were sunk–first with private, and later with State capital. In these mines both household and industrial coal was obtained at depths of up to 1,000 metres. Since 1960, when extensive natural gas reserves were discovered in the Netherlands, the economic importance of coal mining has declined very rapidly. The figures below, showing the consumption of coal and natural gas as a percentage of total Dutch energy consumption, demonstrate how coal has been ousted by natural gas, which can be produced and transported very much more cheaply, is more economical in use and causes less air pollution.

	1963	1972
Coal	41 %	5 %
Natural gas	2 %	46 %

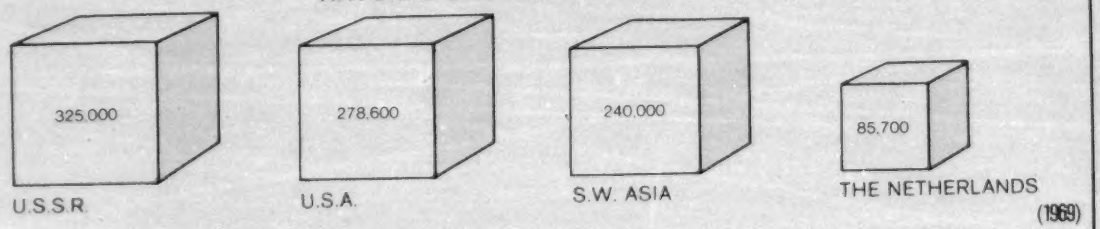
As a result of this trend—to which must be added the fact that coke (principally used in blast furnaces) can be imported more cheaply—the mines are gradually being shut down, even though some of them are still relatively new and have modern equipment. The last mine is to be closed by about 1975. Miners are being re-trained as industrial workers, some of whom will have to find jobs in the chemical industry (which was originally based on the processing of coke gas, but which has now switched to natural gas), and in new enterprises in the industrial and services sectors.

Natural gas
In 1960 one of the world's largest natural gas-fields was discovered in the north of the Netherlands. During the sixties a pipeline network was laid throughout the country with extensions abroad. As a result, natural gas from the Netherlands is now used in West Germany, Belgium, Luxembourg, France, Switzerland and Italy.

Other minerals
A third mineral, oil, which can be used as a fuel or, by the chemical industry, as a raw material, is also found in the Netherlands, though in very limited amounts. In 1972 the Netherlands produced only 5.3 % of its domestic oil requirements. Production in south-east Drente, begun after 1945, is coming to a halt, and is easily surpassed by production in the areas near Rotterdam and The Hague.
The refineries in the Rotterdam port area, which constitute one of the largest refinery concentrations in Europa, process mainly imported oil (mostly from the Middle East).
Oil and natural gas have also been struck during boring operations in several places in the section of the North Sea allotted to the Netherlands in 1958 by the Geneva Convention on the Territorial Sea and the Contiguous Zone for the location and exploitation of minerals.
Vast quantities of cooking salt are pumped up as brine in the east and north-east of the Netherlands. The salt is processed in Hengelo and Delfzijl.
Surface minerals have been exploited for centuries. The marl of south Limburg was previously used for building purposes, but is now also used in the making of cement and calcareous fertilizers.
Peat, previously important as a fuel, is now cut only in south-east Drenthe and is used in horticulture for enriching the soil and for other purposes.
Clay, sand and gravel are used to produce such building materials as bricks, roof-tiles and concrete.



NATURAL GAS DEPOSITS IN 1,000 MILLION CU. FT.



(1969)

Industry I

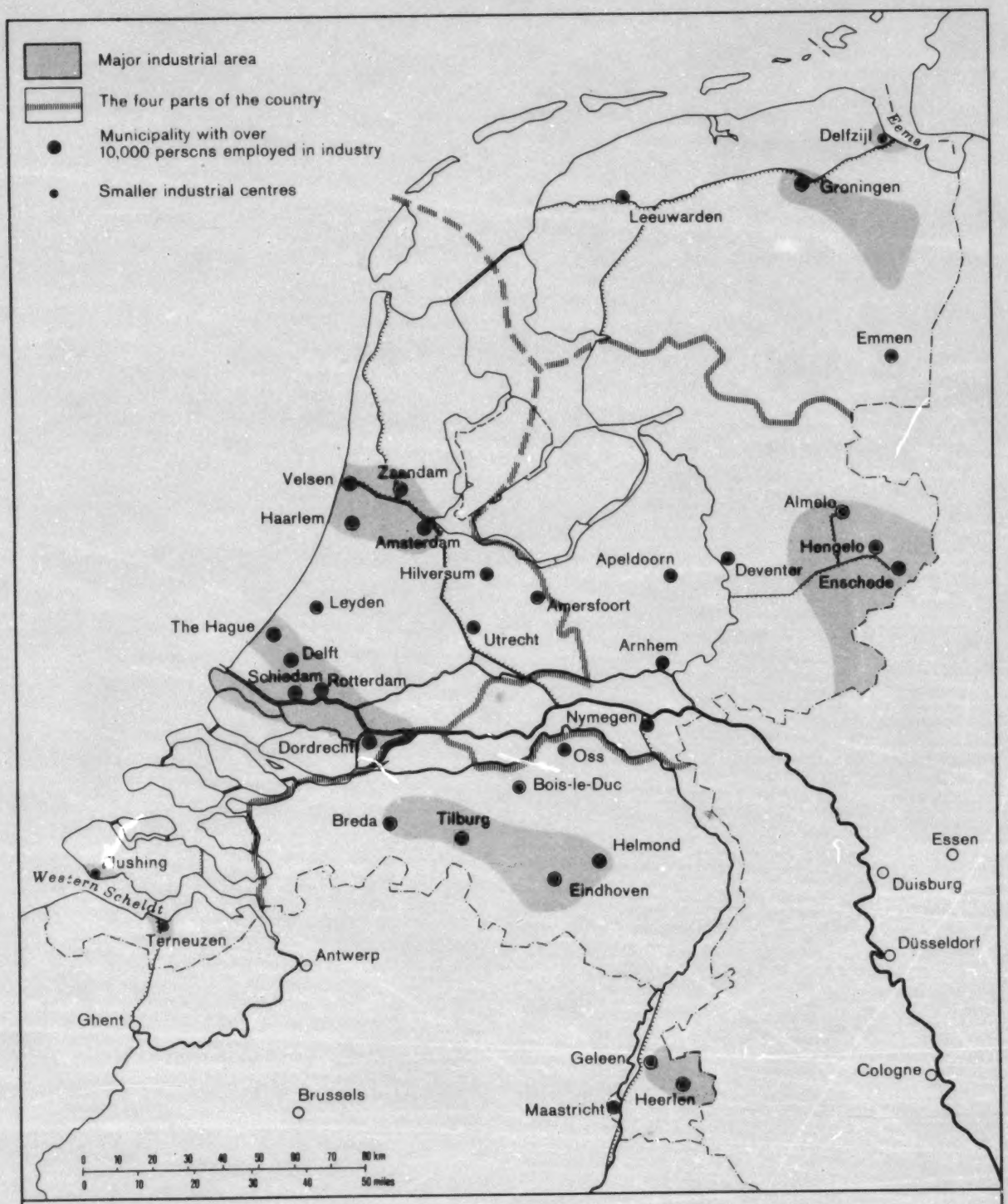
History
The Netherlands had some industry as long ago as the 17th century, which mainly took the form of what were called 'trafiekbedrijven', factories in which imported raw materials were processed, largely for export. Dutch freight carriers brought home grain, wood and other commodities from the Baltic countries and tropical and sub-tropical products from the Far East and the Mediterranean. These raw materials were processed in the 'trafiekbedrijven', which were located in Haarlem, Dordrecht, the Zaan area (north-west of Amsterdam), and elsewhere. The wind was the main source of power. Formerly there were countless saw-mills, flour mills, etc. in the Netherlands in addition to the windmills used for water control purposes. A great deal of peat was also used as fuel. The 18th and 19th centuries saw an expansion of these industries, along with the agricultural industry, which processed domestic raw materials, but there was no question of an industrial revolution in the Netherlands such as took place in the 19th century in Great Britain and Germany.

The 20th century
After 1900, coal-mining and, in particular, the growing need for employment altered this situation. The greatest expansion of Dutch industry dates from after 1945, as can be seen from the following indices for industrial production.

(1963 = 100)	1930	35
	1950	47
	1972	181

As a result of this expansion, in which the establishment of a considerable number of foreign enterprises played a part, 40 % of the national income in 1972 was accounted for by trade and industry, while more than 85 % of total exports was made up of manufactured goods.

Distribution
The processing industry, which, as we have seen, had its beginnings in the 17th century, retains its importance today, though its form has been modernised. Imported iron ore, for example, is processed on the banks of the North Sea Canal, which runs from Amsterdam to the sea, and oil, mostly of foreign origin, is processed on the banks of the New Waterway, which runs from Rotterdam to the sea. It was only to be expected that these areas should develop into the greatest industrial centres in the country. It was natural, too, that supply and service industries, etc., should be established in and around the large cities.
Industrial development went much more slowly outside the western part of the country; on the poor sandy soil of the east and south, however, where farmers had formerly engaged in cottage industries, textile and other industries later developed in cities such as Enschede and Tilburg.
Some industry grew up in other areas too, such as south Limburg and near Groningen, when people began to process the locally available raw materials: in this way, the agricultural industry was born in the north and the chemical industry in the south.
As has already been said, the distribution of industry over the country is uneven and frequently bears no relation to the labour available. The diagram emphasises once more the extent to which industry is concentrated in the western coastal provinces though the south too—situated between industrial regions in Germany and Belgium—has an important share. The east and even more so the north remain far behind.
More recently, however, dockside industries have developed outside the western conurbation, e.g. in the south-west on the Western Scheldt and in the north-east on the Eems. In addition, industrialisation is being promoted by the Government in areas where there is high unemployment as a result of the over-dominance of agriculture (provinces of Groningen, Friesland and Drenthe, etc.) The Government is also intervening in areas such as south Limburg, where the closure of the coal mines has necessitated economic restructuring.



Persons employed in industry per region, expressed as a percentage of the national total

NORTH	EAST	WEST	SOUTH
10%	20%	41%	29%

(1971)

Industry II

The four most important industries are the metal manufacturing industry, the food, drink and tobacco industry, the chemical industry and the textile industry, in that order.
The growth rates of these industries differ greatly, as can be seen from the following volume indices for production for the year 1972 (1963 = 100):

Chemical industry	351
Steel industry	180
Food, drink, tobacco industry	150
Textile industry	116

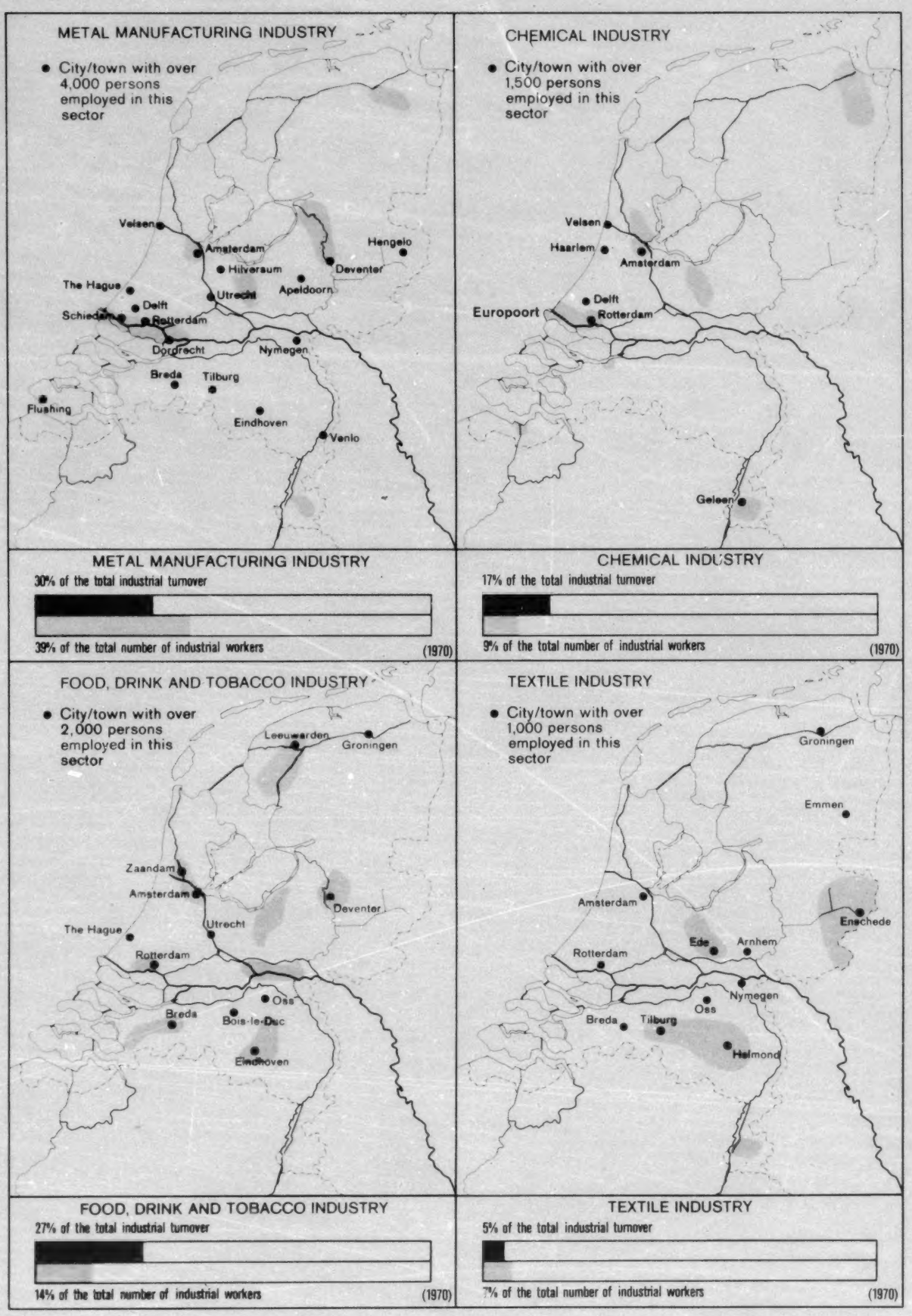
The metal manufacturing industry
The backbone of this industry is formed by the blast furnaces and steelworks in Velsen, at the mouth of the North Sea Canal, which relies entirely on imports for its iron ore.
Steel from the plant is processed into end products in many places throughout the country, notably by the following:

— the electrical industry (including Philips N.V., Eindhoven, with its subsidiaries throughout the country);
— the shipbuilding industry, located in places such as in and near Rotterdam (Rijn-Schelde-Verolme shipyards), Amsterdam, Flushing and the east of the province of Groningen.

The chemical industry
The map shows clearly the two distinct types of chemical industries, those established in the coastal areas, whose raw materials are largely imported, and those in the eastern provinces where local raw materials are processed.
The first category includes the oil refineries in the area to the west of Rotterdam (Shell, Esso, BP, Chevron, Gulf, Mobil Oil) and the chemical industry in Velsen, which processes by-products from the steelworks.
The second category includes the processing of salt and potato meal in the province of Groningen (Delfzijl), and the diversified chemical industry in south Limburg (Geleen: fertilizers, raw materials for synthetic fibres, plastics, etc.), which was formerly dependent on gas from the coal-mine coke furnaces, but which now uses natural gas.

The food, drink and tobacco industry
A similar distinction is observable here as with the chemical industry.
In the coastal areas, on the one hand, the industry is based on imported raw materials: tropical and sub-tropical vegetable oils are processed in Rotterdam (Unilever), and commodities such as coffee, tea and cocoa in Utrecht, Amsterdam and the Zaan area.
In the same way, the tobacco manufacturing industry also began here, though later this industry, formerly so labour-intensive, moved to the sandy areas in the south and east of the Netherlands (an example is the cigar industry centred on Eindhoven).
In other parts of the country, on the other hand, we find examples of this type of industry which process domestic raw materials, *e.g.* dairying (Leeuwarden, in the province of Friesland) sugar-beet manufacture (Groningen, Amsterdam, Breda); the food conservation industry, *e.g.* the processing of fruit in the area between the large rivers; and the meat processing industry, *e.g.* in Oss, in the Deventer area and—more particularly concerned with poultry—the area to the south-east of Lake Yssel.

The textile industry
First of all, we must mention the industrial areas whose rise, as far as the textile industry is concerned, has already been referred to in the preceding chapter. These are Twente (Enschede) and central Brabant (Tilburg, Helmond). Here we find cotton and wool industries, which are at present experiencing difficulties owing to competition from synthetic fibres and from products from countries which can produce them more cheaply.
In addition, there are a number of places where the manufacture (South Limburg) and processing of synthetic fibres are important (*e.g.* Arnhem, Breda, Ede, Emmen and Nymegen).
A third branch of the textile industry, the manufacture of clothing, is located for the most part in large cities like Amsterdam, Rotterdam and Groningen, and in the mining area of South Limburg.


METAL MANUFACTURING INDUSTRY
• City/town with over 4,000 persons employed in this sector
Velsen
Amsterdam
Hengelo
Hilversum
Deventer
The Hague
Utrecht
Apeldoorn
Delft
Schiedam
Rotterdam
Dordrecht
Nymegen
Breda
Tilburg
Flushing
Eindhoven
Venlo
CHEMICAL INDUSTRY
• City/town with over 1,500 persons employed in this sector
Velsen
Haarlem
Amsterdam
Delft
Europoort
Rotterdam
Geleen
METAL MANUFACTURING INDUSTRY
30% of the total industrial turnover
39% of the total number of industrial workers
(1970)
CHEMICAL INDUSTRY
17% of the total industrial turnover
9% of the total number of industrial workers
(1970)
FOOD, DRINK AND TOBACCO INDUSTRY
• City/town with over 2,000 persons employed in this sector
Leeuwarden
Groningen
Zaandam
Amsterdam
Deventer
Utrecht
The Hague
Rotterdam
Oss
Breda
Bois-le-Duc
Eindhoven
TEXTILE INDUSTRY
• City/town with over 1,000 persons employed in this sector
Groningen
Emmen
Amsterdam
Enschede
Ede
Arnhem
Rotterdam
Nymegen
Oss
Breda
Tilburg
Helmond
FOOD, DRINK AND TOBACCO INDUSTRY
27% of the total industrial turnover
14% of the total number of industrial workers
(1970)
TEXTILE INDUSTRY
5% of the total industrial turnover
7% of the total number of industrial workers
(1970)

Trade and transport

External trade

In preceding paragraphs it has been explained that the economy of the Netherlands is strongly oriented towards foreign countries. This is reflected in a substantial foreign trade: in 1971 goods were imported to the value of Dfl. 3,960 and exported to the value of Dfl. 3,695 per head of the population. Manufactured products (*e.g.* imported cars and exported electrical equipment) lead both imports and exports. Raw materials and fuels (oil) take second place on the imports list; on the exports list this place is taken by agricultural and horticultural products.

Map 1 on the next page shows the countries with which the Netherlands carries on most trade. The part played by the EEC partners Belgium, Luxembourg, the Federal Republic of Germany, France and Italy is striking; in 1971 they accounted for about 60 % of foreign trade.

Internal transport

The maps of the infrastructure for road, rail and water transport show how closely-knit the networks of these communications are. The rail map shows all the lines used for passenger transport; the waterways map shows only those routes where the maximum permissible capacity is not below 1,000 tons; and the road map shows all E roads, all motorways and a very limited number of other main trunk roads.

All three maps show the provincial capitals and towns with populations of over 100,000. It will be seen immediately that all these towns occupy important places on the road and rail networks, but that a third of them have to get along without any significant waterway communications. The main reason for this is that the waterways network is largely determined by natural factors, though another reason is that in inland navigation—especially since the Second World War—the emphasis lies much more on external links (with sea and hinterland); road transport has acquired an increasingly important share of internal goods traffic, as study of the diagrams below the maps will show.

If we compare the road and rail networks, which broadly follow the same pattern, it is at once obvious that the road builders have been much quicker to take advantage of the new possibilities opened up by the great engineering projects in the Lake Yssel and Delta areas.

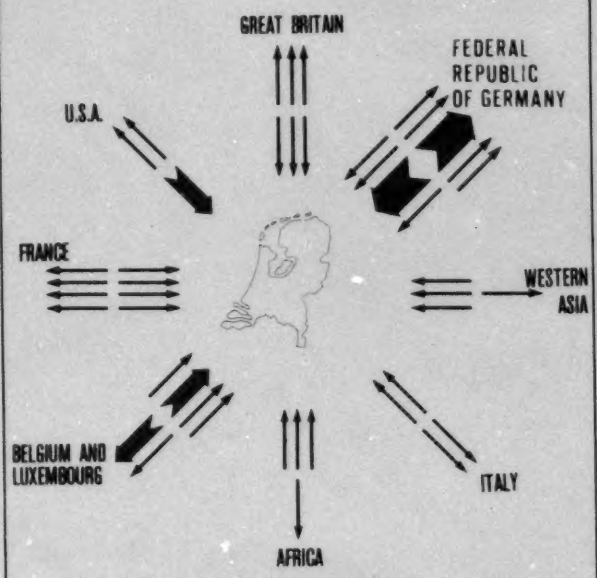
The dramatic increase in road transport, as regards both goods vehicles and private cars, has put the railways in a difficult position. Government subsidies have become essential, particularly since it is now realised that the most densely populated areas cannot do without the railways, especially for commuters.

Aviation

In Schiphol airport, which lies south-west of Amsterdam and is the home base of KLM Royal Dutch Airlines, the Netherlands possesses an important modern airport. A great many airlines operate scheduled flights in and out of Schiphol as part of their European and inter-continental networks. Consideration is being given at present to selecting a site for a second national airport (among the possible sites are western North Brabant and Markerwaard).

Since the Netherlands is a relatively small country, domestic flights are very limited in number.

VALUE OF IMPORTS AND EXPORTS



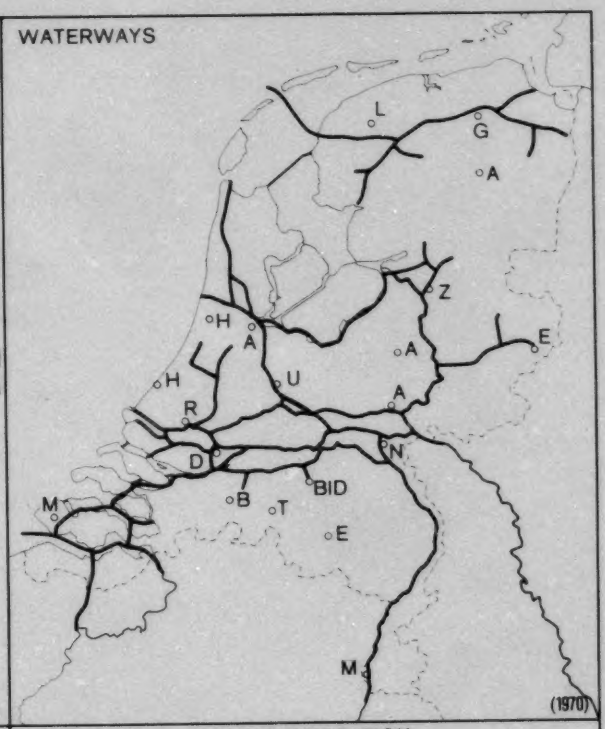
(1970)

10,000 million guilders

5,000 million guilders

1,000 million guilders

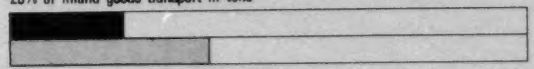
WATERWAYS



(1970)

INLAND NAVIGATION

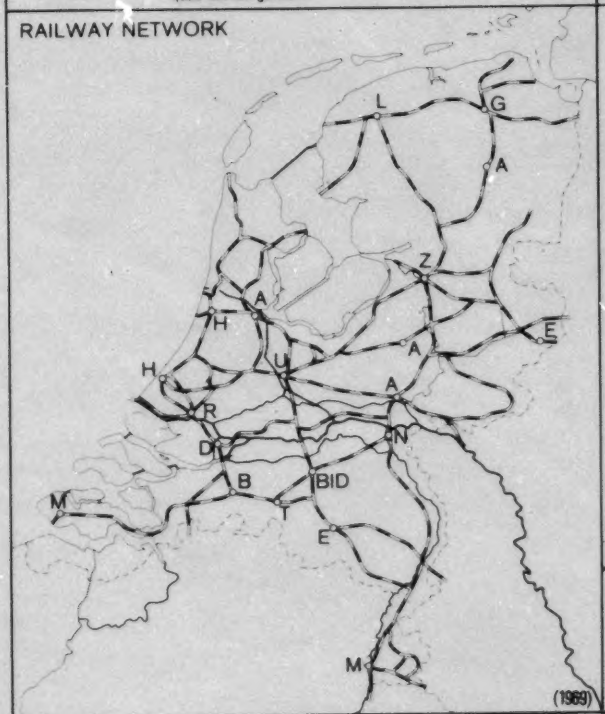
23% of inland goods transport in tons



39% of inland goods transport in ton km.

(1970)

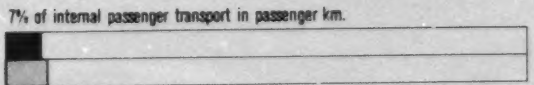
RAILWAY NETWORK



(1969)

RAILWAY TRANSPORT

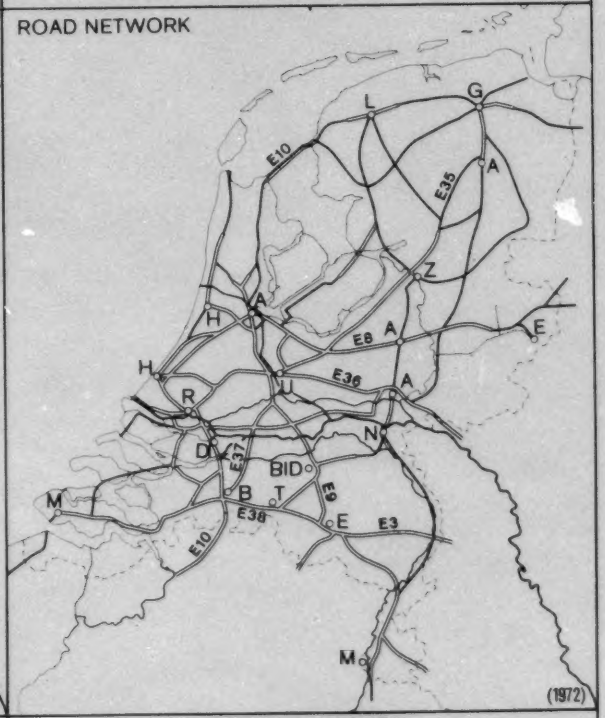
7% of internal passenger transport in passenger km.



8% of internal goods transport in ton km.

(1969)

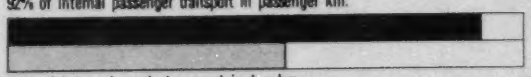
ROAD NETWORK



(1972)

ROAD TRANSPORT

92% of internal passenger transport in passenger km.



54% of internal goods transport in ton km.

(1969)

The ports of Amsterdam and Rotterdam

History

Viewed in broad terms, many parallels can be traced in the historical development of the cities of Amsterdam and Rotterdam. Both cities developed in the Middle Ages at sites where dams were built across small rivers (the Amstel and the Rotte respectively) to reduce the danger of flooding. Later, they developed into the two largest ports of the Netherlands during the Golden Age; in about 1650 Rotterdam had 50,000 inhabitants and Amsterdam more than three times as many! There was extensive trade, particularly with Baltic and Mediterranean countries, and Amsterdam became the centre for tropical wares from the colonies in south-east Asia. A great deal of processing industry (trafiekindustrie) grew up in both areas.

In the 19th century, both cities experienced a period of decline, owing particularly to difficulties with their routes to the sea (sandbanks, etc.). Amsterdam's route ran via the Zuyder Zee, while Rotterdam's route lay by way of the waters between the islands of South Holland.

These problems were solved towards the close of the 19th century, when the New Waterway was built in 1872 to give Rotterdam a direct, uninterrupted channel to the sea; in 1876 Amsterdam followed suit with the North Sea Canal, in which giant locks were built near Ymuiden.

The 20th century

In the first part of the present century, the trading activities of the two cities began to develop in different directions: Amsterdam remained first and foremost a centre for tropical products, while Rotterdam became more and more a transit port for bulk goods—due in large measure to industrial expansion in the German hinterland (the Ruhr, etc.).

During the Second World War much more devastation was caused to the city and docks of Rotterdam than to Amsterdam. When the war ended and the devastated areas had been rebuilt, both cities experienced a westward expansion of their dock and industrial areas, though the expansion of Rotterdam was much the greater. The Botlek plan and the Europoort project rapidly transformed the agricultural island of Rozenburg into a large dock and industrial area. Later, the man-made Maasvlakte came into being just off the coast, and the Rijnpoort project, a special container port, is to be implemented on the north bank of the New Waterway.

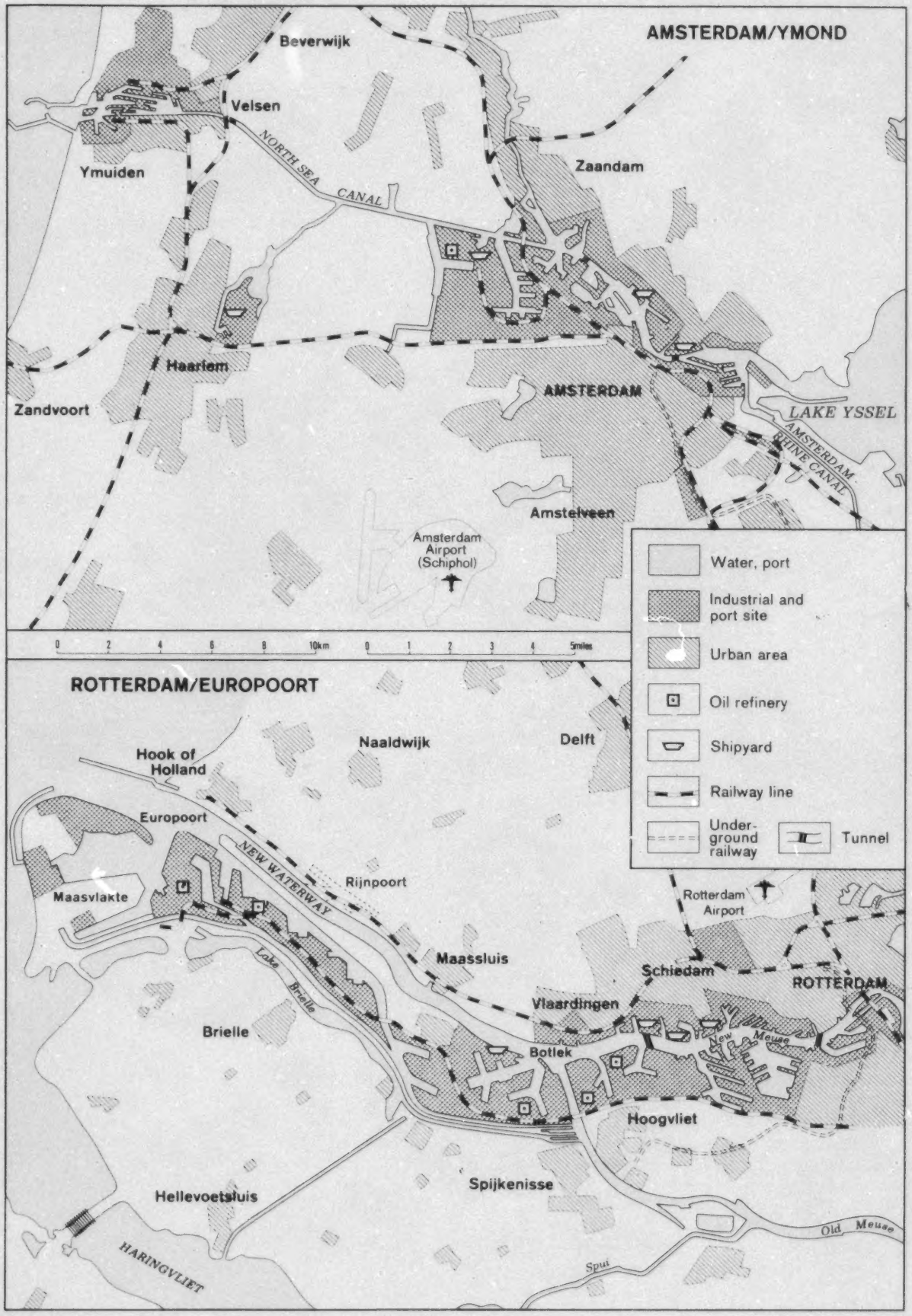
When Indonesia became independent after the war, Amsterdam lost most of its trade in tropical products. The completion in 1952 of the Amsterdam-Rhine Canal and the current improvements to the canal have made transit trade very important to Amsterdam, too.

Besides being the largest industrial city in the country and the second largest port, Amsterdam is also famous as a tourist centre (17th century streets and architecture) and as a cultural centre (Rijksmuseum, Concertgebouw Orchestra, etc.).

Statistics

The following statistics make it possible to compare the Amsterdam region (from Velsen/Ymuiden to Amsterdam, including the Zaan area) and the Rhine estuary region (from the Hook of Holland to Rotterdam).

1972	Amsterdam region	Rhine estuary
Cargo loaded on sea-going vessels (x 1,000 tons)	8,621	61,243
Cargo discharged from sea-going vessels (x 1,000 tons)	21,764	202,910
Total	30,385	264,153
Maximum admissible tonnage	85,000	250,000


AMSTERDAM/YMOND
Beverwijk
Velsen
Ymuiden
NORTH SEA CANAL
Zaandam
Haarlem
Zandvoort
AMSTERDAM
LAKE YSSEL
AMSTERDAM RHINE CANAL
Amstelveen
Amsterdam Airport (Schiphol)
0 2 4 6 8 10km 0 1 2 3 4 5miles
Water, port
Industrial and port site
Urban area
Oil refinery
Shipyard
Railway line
Under-ground railway
Tunnel
ROTTERDAM/EUROPOORT
Naaldwijk
Delft
Hook of Holland
Europoort
NEW WATERWAY
Rijnpoort
Maasvlakte
Rotterdam Airport
Maassluis
Schiedam
ROTTERDAM
Lake Brielle
Vlaardingen
Brielle
Botlek
New Meuse
Hoogvliet
Spijkenisse
Hellevoetsluis
Old Meuse
HARINGVLIET
Spui

Physical planning

Plans for the future

In a densely populated country like the Netherlands it is obviously necessary that plans for the physical environment should be drawn up and implemented with great care.

In 1966 the Government drew up a number of guidelines, which are summarised on the map. The complete structure map indicates how the people could be accommodated if the population of the Netherlands increases by about a half (compared with 1966) by the beginning of the 21st century, when the density of the population would be over 550 inhabitants per km² (1966: 375).

The increasing population, the continuing economic growth, the rise in the standard of living and the ever increasing need for space for working, living and recreation will mean that the demand for many facilities will increase by more than half during that period (see forecasts concerning roads and drinking water supplies below the map).

The first part of the Third Memorandum on Physical Planning in the Netherlands appeared at the end of 1973, the Second Memorandum having been published in 1966.

The urban areas

Urban areas should not be thought of as areas of urban sprawl (that is precisely what must be avoided), but as areas where urban life clearly predominates.

The areas concerned are as follows:

1 The northern part of the West Holland conurbation
2 The southern part of the West Holland conurbation
3 The chain of towns in Brabant
4 South and mid-Limburg
5 Twente
6 Groningen and the Eems area

With two exceptions, all these areas lie in the west and south of the country. For this reason, the Government is seeking ways of distributing the population more evenly, in order to relieve the pressure on the overcrowded west on the one hand, and to stimulate economic activity elsewhere on the other.

The Government plans to achieve this by the following methods:

— by transferring various government departments to the north and east of the Netherlands, and by encouraging labour-intensive private enterprise in the tertiary sector to follow suit;
— by creating favourable conditions in order to make the north and east more attractive to industry;
— by encouraging the growth of new sea-ports *e.g.* along the Eems).

Rural Netherlands

The Government Planning Service makes a distinction between three types of area:

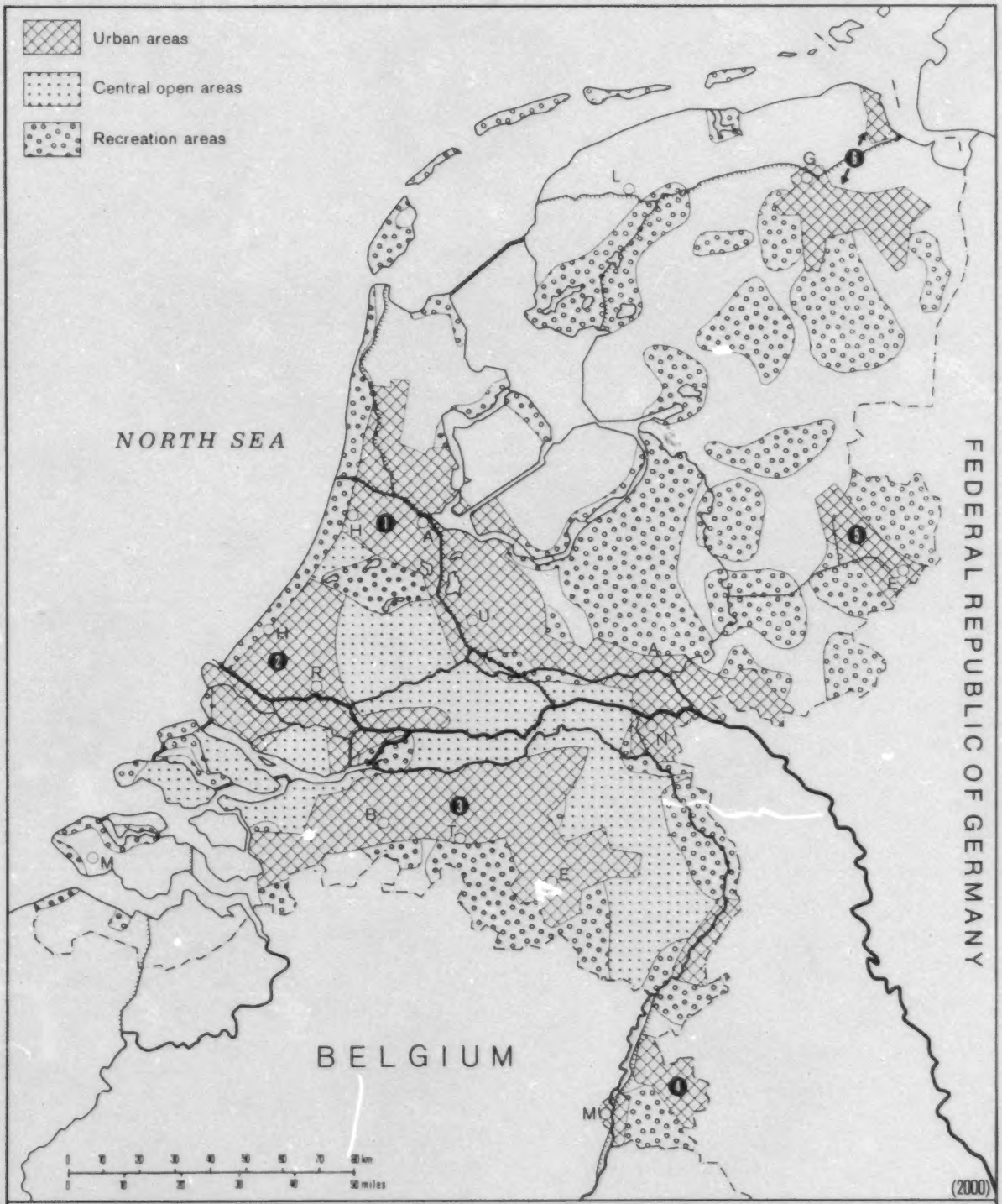
— large-scale agricultural areas, situated predominantly in the north and south-west of the Netherlands and in such of the Lake Yssel polders as are already under cultivation;
— mixed agricultural and recreational areas, situated mainly in the sandy regions in the east and south of the Netherlands;
— areas within the urban sphere, including the so-called 'central open country' between the urban areas proper, and the buffer zones between the urban regions and the rural areas within them.

There are various points of departure for the development of these areas. In the large-scale agricultural areas, agricultural interests will predominate. In the mixed agricultural and recreation areas, agricultural and recreational interests will have to be reconciled as well as possible. Lastly, in the rural areas within the urban sphere endeavours must be directed primarily at maintaining the open spaces to contrast with and complement the city. There will be room for some agriculture as well as recreational facilities.

In all the rural areas, attempts must be made to achieve a satisfactory reconciliation of a number of frequently conflicting interests—interests such as those of agriculture and recreation, of the cities and of transport, and of the protection, and if possible enlargement, of important nature reserves. This means that restrictions may occasionally be deliberately placed on economically profitable farming in the interests of conserving the beauty of the countryside (country parks).

The map also shows the principal recreational areas. Broadly speaking, they are of three types:

— the sea coast (including the Wadden islands);
— the aquatic sports areas, such as the lakes in Friesland and the northern part of the West Holland conurbation, the peripheral lakes around


Urban areas
Central open areas
Recreation areas
NORTH SEA
FEDERAL REPUBLIC OF GERMANY
BELGIUM
(2000)
LENGTH OF PRINCIPAL ROAD NETWORK
1966 1,550 km
2000 5,300 km
WATER CONSUMPTION
1966 700 million m³
2000 3,750 million m³

the Lake Yssel polders and the lakes in the Delta area;
— the varied countryside in the High Netherlands, with its liberal scattering of woods and heathland.

Government organisation

The Physical Planning Act 1965 provides for the organisation of physical planning to be based on the existing levels of government: national, provincial and municipal. But the onus falls on the more than 850 municipal authorities, who are required to draw up development plans for the land under their jurisdiction which does not form part of built-up areas. Once a number of procedures have been followed (the public are given the opportunity to appeal and the approval of the provincial authorities is required etc.) and a plan is adopted, it becomes legally binding. This is not the case with municipal structural plans for the whole of their areas, with the regional plans for the provinces and with the guidelines laid down by the central government. Municipal plans for land use must be reviewed at least every 10 years.

Various forms of inter-municipal cooperation have developed in a large number of areas in addition to the instance already cited, the Rijnmond authority. Statutory provisions relating to the formation of regions, at present in preparation, will satisfy the obvious need for more regional cooperation which has arisen from the economies of scale everywhere apparent.

Lastly, cooperation at an international level will also be called for, especially in view of the Netherlands role as the 'Gateway to Europe', located in the midst of other densely populated countries.

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